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Incidents of the Wild

Which prove the ever-present, ever-tangible promise of strength the wilderness holds

By JOHN LINDSEY BLACKFORD

Illustrated by R. Bruce Horsfall

A SOUND suddenly dominated the forest. It caused me to pause, striving to identify in the familiar loud tattoo the unfamiliar quality that added such hollow reverberation to the hammer-notes of the great pileated woodpecker.

Again, and quickly a third time, came the stentorian call. The loud, resonant tones of that sonorous hammering went booming and vibrating through the heavy forest like the roll of a barbarian drum. I had not heard its like before.

Hastily I dived into the undergrowth, hurrying in the direction from which the quite ventriloquial sound seemed to emanate. Brushing through thickets, sliding over bent and fallen trunks, and leaping mossy seepages, I descended a low rise, came to a path I well knew, followed it, and once more mounted the slope. The call had come again, and here I heard the long, deliberate roll as I halted to look about me and await its recurrence. I advanced half a hundred paces but retraced them when the hollow hammering, apparently from the rear, recalled me. I had seen nothing.

Moving about cautiously on the slope I was unable to locate the drummer, although the resonant tattoo was repeated twice more. Then there was the rasp of clawed feet climbing. High on a tall tamarack stub, at the base of which I had first stood to listen, I made out the form of the lordly log-cock as he shifted his position.

Perhaps the crimson-crowned woodsman had sensed his discovery or already his wings may have been tensed for flight, for on that instant he was in the air, speeding off down the treetop aisles. At last, from some far forest giant, he voiced his stirring bugle cry.

There remained the problem of that phenomenal hammering. The tamarack from whence it had come had lost its top, I observed, at a height close to sixty feet. For a time thereafter a branch had turned and grown upward, providing a new top for the tree. Eventually the tree had died, and stood there, a tall broken stub with misshapen branch and graying trunk. To the splintered end of the latter the great cock-of-the-woods had clung, and he had delivered his rapid mallet-like blows upon a large slab that was nearly separated from the broken trunk. The stub as a whole had served as a marvelous sounding board for the bird's efforts. Here had occurred one of those diverting and often fascinating incidents by reason of which we are ever lured within the borders of the wild.

Doubtless in the lives of all the woodfolk; among the hunters and the pursued; in flock, in pack, in herd; in nesting colony; along the trail of the lone predator and the lone forager; there are enacted many gripping dramas. Despite the disposition of most species to live and let live, to adhere to ways that interfere little in the lives of others, and even of the majority of flesh-eaters, scarcely to disturb those they seek not as prey, the paths of wild life cross at many points. What bird or beast, indeed, is without neighbors?

Many a tragedy there must be, witnessed only by the furred and feathered, and never recorded save on the unwritten pages of their experience. There are comedies and burlesques as well, and situations, too, that partake of melodrama; but we may guess that for the greater part we are not spectators, and only seldom does chance or fortune admit us to the play. Infrequently some among us glimpse briefly the climax of one of Nature's plots. Then it is that we have wondrous tales to relate. Yet, generally, the osprey makes its catch unseen; the wolverine takes the trapper's victim unobserved. Rather, how-

ever, it is the everyday events out of doors that are the incentives to our excursions in forest and field.

The certainty of such happenings wherever wild things are not overly molested gives always the promise of adventure to each ramble in wood, along lakeshore, through marshland and across meadow. In time almost every thicket, glade, and rill comes to have its gladdening association.

Perhaps the picture that ties the memory to this or that spot was but the burst of a grouse from cover; another time it may be the silent, shadowy shape of a horned owl glimpsed momentarily in the gray mist of morning; in this little canyon it is the deep azure and turquoise of a mountain bluebird seen against a wall of dark evergreen; and yonder from the osiers we can still hear the winsome early notes of the Calaveras warbler. It may be more than these, yet it is with them that we lovers of the outdoors can at will make all our yesterdays our today.

"INDELIBLY ETCHED UPON THE MEMORY IS THE DIVING THRUST OF A WESTERN REDTAIL AT A PINE SQUIRREL"

On an April morning canopied with ragged white clouds and fresh blue sky, I stepped from the timber into the cuttings of a beaver colony. In crossing their woodyard I clambered upon a felled cottonwood that bridged a canal leading from one of the larger ponds. The canal was narrow and deep. Barely was I on the log above it, when a dark form passed swiftly beneath me. Such was the speed of the underwater swimmer that a not inconsiderable wave was raised upon the surface and the bottom was left roiling in his wake. In those few fleet seconds I came close to kinship with the wild; my own heart felt the tumultuous emotions that stirred the wild heart of the beaver.

We were stepping, one day, from a leafy wood when, scarcely more than ten paces ahead, a large water bird left his stand by the marge that edged a grassy knoll and took deliberate flight away over the slow moving stream. It was a great blue heron, and in his stately presence and departure there was an intangible something that clothed the unfrequented water-course with impressions far beyond the commonplace. In the blue heron, great chieftain that he is among the clan of waders, we had beheld the outstanding notable of these aqueous haunts. And as he went, winging low above the winding brown water channel, there was left for all our hours of revery one of those unforgettable scenes of which Nature is the unrivalled master.

Like a collector of gems who opens his cases at intervals to renew his pleasure in the scintillant jewels, or as one gifted with a rare sense of touch fingers his tablets of jade, thus do we who are lovers of the winged and four-footed ones delight to recall over and over pictures like this, and to hang them in the gallery of our recollections.

Then, too, there are those brief experiences with Nature—the glimpse of this, or the sound of that—which have a way, so to speak, of taking tickets forever after upon the train of our thoughts. One afternoon in late September when the sun was shining warmly upon southern slopes, I saw, for a short minute, a bear as he fled in haste up a tumbled rock slide. My abiding impression was of the brilliant rippling sheen of his glossy black coat. Indelibly etched upon the memory also is the diving thrust of a western redtail at a pine squirrel. The incautious climber had run far out on a bough in his quest of cones, and as he sat erect upon the swaying fir branch rather well above the surrounding treetops he was an inviting target for the deadly attempt.

Of lasting beauty is the recollection of a great hawk soaring high against white, castellated clouds, or of a wavy crescent of waterfowl that seemed to hang suspended over a sea-green river. A swift line of them flying low over glinting rapids brings to mind other days and many treasured remembrances. We marvel ever at the accurate flight that takes cormorants speeding along in watery troughs below the ocean crests, unobserved for the most part as they pass us by, travelers on unseen flyways.

Memory of the leap of trout in the morning pool leaves us endlessly restless indoors. Yet, you will agree, it is

the blue sky and the breeze, the warbler's song, the mist-hung cascades, the boiling current and the green, mossy boulders, together with the likelihood of further adventure that draw us to stream and lake fully as much as does the angling we anticipate.

An unusual happening in the woods marks indelibly one Fourth of July morning. The sky was an intense blue, the sun hot, and by eleven the air already shimmered with heat reflection. A hundred paces from the edge of the deeper forest I mounted through an open stand of young pines to the summit of the hill. On the last slope, covered well with mountain alder, I dispossessed a celebrating chipmunk from his stump and seated myself upon it.

Perhaps ten minutes had passed leisurely when there appeared, approaching up a little-used trail, some animal whose progress was best defined by the rustle of bushes along the way. The low, flat, broad, thick-set, powerful form described a badger, and such it was. He advanced at a deliberate, rolling trot, half pausing once to glance back over his shoulder. Freezing to the stump I watched. He came on. The path forked not more than a dozen feet in front of the stump, the main trail passing within a couple of yards to my left as it climbed to the bench just above; the other branch, a faint path, divided a low laurel thicket, continued parallel with the slope, intersected a second growth of alder, and led downward slightly into a thick, dense clump of small firs.

"... SHADOWY SHAPE OF A HORNED OWL GLIMPSED MOMENTARILY IN THE GRAY MIST OF MORNING ..."

The newcomer, arriving at the forking of the pathway, behaved strangely. Swinging around abruptly he faced his back-trail. Half-crouched, motionless, he stood, hindquarters low, shoulders higher, broad head thrust forward, pointed nose lifted at an angle, his penetrating gaze fixed in the direction from which he had come. There was rugged strength not unmixed with grace of line in the stance of that doughty digger.

The action of the badger had seemed formidable, almost antagonistic, but his manner remained imperturbable. I snatched a brief moment to glance down the trail. I saw nothing. Sixty seconds fled. I looked again. A deer—no, a fawn appeared from among the spreading pines, hesitated on the path, stopped and with large ears held forward, stared mildly towards us. There followed a brief, electric interval. At last the fawn, dropping its head, nibbled at the sparse grass; came on again. Once more she paused, a fawn that had outgrown her spots, graceful, dainty, delicate, innocently, yet persistently curious. I expected a doe to follow but none came.

The badger, clear to my view save for the short scrub that hid stocky legs and clawed feet, satisfied apparently as to the circumstances of the incident, turned about and trundled off along the lower path, the silver gray of his sleek summer pelage glistening in the brilliant sunshine. He rustled through the second thicket of alder, kept to the trace of a trail, entered a small opening in the fir clump and disappeared.

The fawn gazed curiously after the departing burrower; resumed leisurely her trailing of him, if such it was, for she succeeded well in concealing any obvious intent to do so.

At the branching of the way the fawn halted, observed where her predecessor had directed his course, lingered along the trail after him and disappeared also at the same spot as the badger. Until that moment I had refused to allow myself the belief that the independent little fawn was actually engaged in following the redoubtable badger, but with that last glimpse of her I lost all doubt. Each had come, paused, and passed within twelve feet of me, remaining oblivious to my near presence, although screened but poorly as I was by a single young pine tree. The behavior of fawn and badger alike had been altogether natural, entirely oblivious as they were of a third party to the little drama. Here, truly, was a glimpse into the undisturbed wild.

A bright autumn noonday found me skirting the northern margin of a lily-pad lake far back among wooded mountains. Along the steep bank I climbed over old logs and down timber, maneuvered through tangles, and fol-

lowed the short trails of fishermen in the brush. Possibly the dark waters stretched a mile from end to end, curving around a rounded point of the north shore, while the breadth of the basin could not have exceeded one hundred and fifty yards. The lake was marshy at its inlet and about its overflow. Gaunt trees, once ravaged by fire, climbed the hills in irregular files. Young larches clothed the terrain with lighter green. My way by the water was largely among birch and mountain alder.

One could find much of interest to compensate for the roughness of the trail. Here was an ancient beaver lodge and new cuttings on the bank. Again I studied the curiously patterned sap-wells of the red-naped sapsucker discovered on the crooked and leaning trunks of the alders. Farther on small firs and tamaracks had been included by the beavers in their tree felling; a few of the conifers had been partially barked as well. My stooped and halting advance through a dense stand of small evergreens brought me to the scene of a minor woodland tragedy. The scattered feathers of a ruffed grouse attested to the craftiness of some skilled hunter.

My eyes had scanned the lake as well; the nearer border of sallow green lily pads; the mirrored surface; the farther line of floating leaves and water weeds; the numerous weathered and moss-grown trees that had fallen into the water along the opposite side, and I had trusted them to reveal to me such aquatic life as might chance to be abroad at midday. But no dweller of the wild had been glimpsed, although I was already around the half way point of the shore. It was then from beyond and across the still, dark waters, from just within the farther line of motionless lily pads, that there came a flash of white. Having but glanced along that placid marge, I was startled by this inhabitant of the lake that I had not seen. So characteristic, however, was that movement, that display of color, that I knew but one cause for it—the buoyant stretching of his wings by some waterfowl, a duck likely, as he raised himself restively upon the surface. Yet it was not until a minute later, when the bird whose protective coloration blended indistinguishably with the background, spreading his pinions once again, disclosed as he had done upon the first occasion the light undermarkings of his outstretched wings, that I was entirely convinced of his presence there.

And those bright wings, flashing, so unexpectedly, notice of his presence there, flashed also a message. "Here in the wilderness is Life," it said, "here is Beauty. And for you, too," it signified, "here is life, here is beauty, here is peace—peace for the heart."

And verily it is thus, for who can behold the carnation flush of a silver-curtained dawn, gaze upon the gossamer veil of a waterfall, or view the golden shafts of the westering sun striking down through needle-plumed branches and burnishing the reddish boles of the pines, without being the better for it? To all the spent and to all the weary, the wilderness offers an ever-present, ever-tangible hope, the promise of recovered strength and renewed life; while for the spirit there is peace and for the soul rest.

All of these gifts and these benedictions we may claim as our inalienable possessions while still we have with us the trackless and undespoiled wilderness. Sure we may be then of many of these alluring adventures with Nature's children. That this priceless heritage, continuously threatened, may be no further diminished, our fight to preserve it must grow increasingly militant. If ever there has been struck within us the merest spark of the love of Nature and of Created Things, it is certain to be kindled by such experiences until at last we may share in the truly civilized thought of that supposedly savage red man who said: "The stones, the coyotes, and the stars—they are all our brothers."

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This posthumous poem was found among the effects of a young California artist who, throughout his life, was a great lover of birds. He met his death in one of the air tragedies that marked the winter and spring of 1937. He had been associated with the Walt Disney studios.

To a Silenced Songster

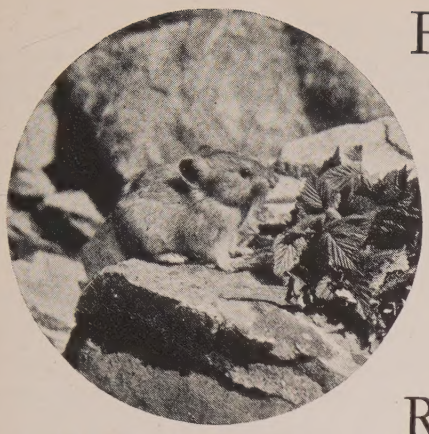
By FRANK TEAGUE

Come, lift this head and scold awhile!
What makes you lie so still?
But moments since, with mocking ease,
Your flight defied the wind-tossed trees:
Where now is skill?

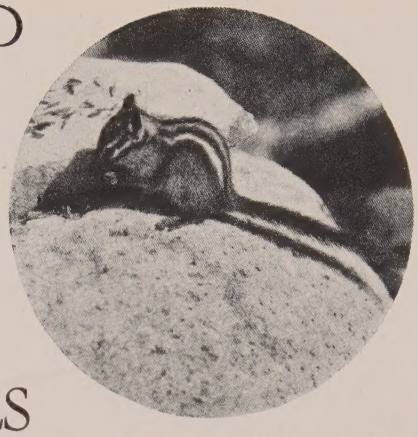
You sang of hope—of days to be:
These notes were surely true?
And yet—perhaps were not your own
Indeed were but a simple loan—
And now come due.

Warm, feathered purse, the coin is fled;
But grace requite the borrow!
Could I with half your skill invest
This fragile life at interest,
'Twere greed indeed to sorrow.

FOUR-FOOTED KINGS OF WESTERN ROCK CASTLES



A PIKA OR ROCK-RABBIT ABOUT TO DINE ON ONE OF HIS FAVORITE DELICACIES, TENDER RASPBERRY LEAVES



THE CHIPMUNK CONTINUES TO GATHER HIS WINTER SUPPLY OF SEEDS AFTER THE FIRST FALL OF SNOW

By HAMILTON M. LAING

HIGH up in the Rockies and allied ranges, where winter is long and the short summer is a season of wondrous loveliness, live some of America's least known smaller mammals. They are little known because they live in a land of seven or eight months of winter and are buried from sight most of this time. In the mountain parks the visitor is sure to get acquainted with the larger mammals: bear, deer, sheep, goat—the obvious; he is likely to see much less of the smaller, humbler folk: whistling marmot, pika, Columbian and golden-mantled ground squirrels, and chipmunk. These inhabitants of the rock-slides and meadows at the feet of the high crags are the kings of the skyline, and such little creatures tell a chapter of natural history quite as interesting as any chapter from the lives of big game.

Where the disintegrating cliffs break off abruptly and, yielding to the wear of time, drop their fragments upon the slowly accumulating talus, there are built the castles that are home to these little kings of the high places. Usually the debris fills a draw or head of a ravine, where on either side, with the passing of the snows in mid-summer, the lush alpine vegetation springs to life to paint the slopes with color. Most of the small mammal residents here are vegetarians, and they have the two main necessaries that go to make life for them worth living: food and shelter. The vegetation here during its short life at from four to seven thousand feet is luscious and abundant; the shelter is ample and substantial—the rocks in a slide usually running the gamut of size from a bun to a boxcar.

Travellers in summer through the high alpine solitudes often suddenly find their ears greeted by a loud, far-sounding clear whistle that, coming from nowhere in particular, seems to fill the air. The whistled note is quite prolonged; it is rather high-pitched with something of the resonance of a steam calliope. Here, crouching flat upon a boulder, is the author of the whistled challenge, a gray-mantled marmot, almost as large as a badger.

The marmot or groundhog family in America has three branches: the common woodchuck of the east, the yellow-bellied marmot of the dry lands of the mountainous west, and the hoary-mantled brother, *Marmota caligata*, a lover of the high elevations. Of all his relatives, the latter seems to me to have the greater claim to beauty, his gray or even whitish shoulder mantle, brown hind parts, black feet and comically banded black and white face all combining to give him, while in good pelage, an appearance striking and even handsome.

At sight of a caller, which in the wild commonly is synonymous with danger, the whistler usually bounds up to his look-out rock, gives his challenge, then crouching flat, lies immovable. When running he has a rather awkward, bounding gait, because of the shortness of his legs below his long heavy body. He often rises from the earth to pose "picket-pin" fashion as do the ground squirrels, with his fore-paws on his ample paunch; and he possesses the trick of his smaller relatives also, of flicking his tail —undoubtedly a signal to his kind just as is the case of tail wig-wagging in many other mammals. When pressed, of course the marmot will "go below" and the rock-slide truly is an impregnable stronghold.

And well he needs a castle! All through his life his every waking hour is haunted by the fear of his arch foe, the golden eagle. The coyote, too, makes many a whistler meal, and often we yet may see veritable cellars where Ephraim the grizzly has been excavating for a meal of hoary marmot.

Like the other members of his far-scattered family, the hoary marmot sleeps away the long winter. The succulent vegetation in early fall provides him with abundant material to produce the coat of fat that will sustain him through the long six months of inaction. Winter comes early at his altitude, and in October, when the snows are crowding down from the white summits, he retires to a safe den and presumably becomes as dormant as does his better known eastern brother, the common ground-hog.

Little neighbor of the whistler is the pika, *Ochotona princeps* and allied races, and of all the creatures that love these high slides of the mountain realms, he most truly is part of them. This little gray-furred creature of many names—pika, coney, rock-rabbit, little chief hare, hay-maker—in his general cut may resemble a tiny rabbit more than he does any other of our smaller creatures,

BY NO MEANS THE HANDSOMEST

Yet the Columbian ground squirrel has some claim to beauty. Seen in the lush mountain meadows his contrasting gray and orange-brown colors are pleasing

but he certainly is no rabbit, and science has placed him in a class by himself, coming between the porcupine and the hares. Yet despite his wide range, there are hundreds of folks who come yearly to the western mountains and meet this strange little fellow and marvel—people for the most part who previously have not even heard of him!

On account of the smallness of the creature and the bigness of his surroundings it always takes a quick eye to locate him. Now he skips down the slide, or up, as though suddenly reminded of an errand forgotten; now he runs out to the edge of the slide to nibble the greenery; and always he is forsaking any occupation to pop on a lookout rock to scan the horizon for trouble.

His call has been described as a high-pitched nasal *eenk!* and probably that covers it as well as any other description. There is another call probably more of the nature of a "song" in which the performer delivers a long roll of rapid *eenks* culminating in one of the usual notes. The short note is the alarm and general signal.

One of his numerous appellations, hay-maker, is well applied. Pika's summer occupation consists of one steady chore: preparing for the long winter. So in August and early September, when the vegetation of the high slopes has reached its growth, this little farmer of wild hay gathers his fodder, storing it to dry under sheltering rocks where it will be available through the long months when all the slides are deep-buried in snow. By dint of endless toil, day after day, he adds to his store till his little "mow" may hold a heap of well-cured fragrant hay, in quantity to fill a bushel basket. Nor is he content with one such store, but usually has several. Often we may see him plying fifty or sixty yards between his "field" and his "mow."

Another rock-slide dweller of the high places is the golden-mantled ground squirrel, of the genus *Callospermophilus.* On account of his activity and handsome coat this chap catches the visitor's eye more quickly than does the little gray pika. For the squirrel, with his reddish mantle over head and shoulders, and his heavily striped back, greatly resembles a large chipmunk. Indeed, the mantled ground squirrel is often called big chipmunk or rock chipmunk to distinguish him from his lesser relatives, the true mountain chipmunks, *Eutamias.*

This animal is far better known to visitors than any other alpine small mammal because of his confiding habits and general tameness. His love for man is, of course, purely a gastronomical attachment, for he is a voracious eater and devours almost all foods used by humans. He is equally at home whether purloining oats from the packer's stores or begging for a picnic sandwich from the tourist-visitor. Where he comes in daily contact with indulgent man he soon becomes tame to the point of impudence, eating out of hand with perfect sang-froid.

One trait that convinces people that this confiding fellow is a chipmunk rather than a ground squirrel is his way of packing off food to store it for future reference. Give him oats, nuts, raisins or any such food and he wastes little time in eating; instead he crams the offerings into his mouth, and not until his cheek storage is exhausted and he wears the facial appearance of an exaggerated case of mumps will he dash off to hide his plunder.

It is about the time the first snows of September creep valleyward that we see why this ground squirrel is what he is, rather than a chipmunk. Daily now he grows more fat until, if food is abundant, his rotundity is quite comical. The true chipmunk at the same date is as lean as ever, and laboring every hour to increase his hoard of seeds. The mantled ground squirrel plainly puts his store on his back and, like the whistler, lies dormant through the winter.

The fourth member of the interesting association of rock-slide dwellers is the Columbian ground squirrel, *Citellus columbianus,* but he, least of all, is dependent

BY NO MEANS THE HOMELIEST

Best known for his confiding ways, the golden-mantled ground squirrel is one of the handsomest dwellers of the rock slides

BEDTIME IN THE ROCKIES

Early fall brings the snows down from the skyline ridges into the timber, and the ground squirrel, pika, and whistler "go below" for the long siege of winter

upon such castles and covers a great deal of the alpine meadow lands as well.

This chap is a noisy fellow. When we first see him usually he is rushing to his den or to the nearest rock-pile. But he does not flash down out of sight—not he. Nine times out of ten, when he has reached the door of safety he sits erect and sends his shrill, chirping warning abroad—a call repeated again and again to be taken up by some relatives nearby and passed along into the distance.

Many are the enemies of this dweller in the alplands, but of them all, none perhaps is so persistently on his trail as the golden eagle. There is no more familiar and typical mountain sight than the blackish, ominous form of this great hunter winging about the high cliffs. The dwellers of the rock-slides must regard him as their most relentless foe. Another foe to be reckoned with is the grizzly, now, however, driven from large sections of the ground squirrel's range. It is the fear of the claws of the great digger that has bred in the squirrel and marmot the cunning to locate their burrows under the rocks.

Still another four-footed mountaineer loves the high slides and must be included in a survey of these little kings of the rock castles. This is the mountain chipmunk, genus *Eutamias*, a tiny chap nearly always correctly named by the visitor because of earlier associations at lower elevation and, because of his grace and sprightly ways, a creature beloved by all.

The life problems of this little fellow are much the same as those of his neighbors of the same habitat. The same fortress is his strength against the same foes and the same food is available. But in life habits there is considerable difference. In his winter preparations, for example, the chipmunk, like the pika, must provide a store of food against the six long months of imprisonment; and how he works! While pika is hay-making in August and September, the chipmunk is seed-gathering. Seeds, seeds of any sort, fill his cheeks as he bears them off to his storehouse. From the seeds of the fuzzy-topped anemone to those extracted from any berries within his range, he farms them all. He even climbs aloft in the stems of the alpine thistles, and defying a hundred

GUARDING THE ENTRANCE OF HIS CASTLE

A hoary marmot pictured at the door of his impregnable stronghold, the entrance of which is too narrow to allow a larger enemy to enter and ferret him out

spears, cuts the heads and extracts the flax like seed-provender.

This tiny fellow is the most active of the slide animals. Out early in spring, the last to retire in the fall, his whole summer is one round of activity. The Columbian ground squirrel goes to bed first, earliest at low elevations; the mantled ground squirrel follows about the end of September when the snows reach the slides; the chipmunk refuses to hole up till he is forced to; he outlasts even the whistler.

These creatures in their sky castles, subsisting on the greenery of the highest of pastures, are but another application of the rule that Nature has made no environment without at the same time making a creature to call it home. Other mammals come up to the high ranges: the sheep and goat to pasture in summer, the weasel, coyote and wolverine to prey upon weaker folk; but the year-long dwellers of the cliffs are the real inhabitants. They call the rock-slides home and spend their entire lives there. And each to his way of life; doubtless marmot, pika and ground squirrel are as happy and as comfortable in their apparently hard environment as are the seemingly sun-pampered animals of equatorial lands where food is always plentiful.

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Decorate Your Aquarium

By WESLEY W. KUHLMANN

TO THOSE who like to have their home aquariums and fish ponds conform as near as possible to the natural haunts of the finny tribe, it may be interesting to know that many curious and fantastic shapes of wood can be found in the lakes and streams in forested sections of the country and used for the purpose.

Through the action of the current, the softer parts of wood from the many trees that have fallen into these waters have been worn away, leaving the knots and harder pieces in odd shapes and various sizes.

Referring to the lower photograph, many images of Nature forms, pinnacles and tunnels can be found.

In preparing selected specimens for a small gold-fish tank, the writer uses the following procedure. The wood is first kept in a dry place for a month or two. It is then re-soaked in a pail of water with a few drops of a sterilizing agent, mercurochrome for example, added to eliminate any possibility of introducing a fungus disease. It is allowed to soak in this solution for one week, after which it is soaked in clean water for a few days and then put into the aquarium with selected stones and gravel. Being water logged, the pieces do not have to be weighted.

AQUARIUM ART

Waterlogged bits of wood, when prepared according to the suggestions, make attractive additions to aquarium or fish-pond

An interesting day's outing can be had in looking for these ornaments, either with the aid of a rowboat or by walking along wooded streams. In either case, of course, one should search where the water is clear and shallow and the bottom can be easily seen and readily reached.

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CURIOUS SHAPES AND SIZES

A few of the many forms that can be found in a convenient creek bed of a forested area

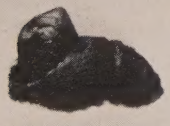
A Peep at Polyphemus

By
JOHN WILLARD BAECHLE

Photographs by the Author

Cocoon in hornbeam leaf

The moth begins to emerge



Empty shell of chrysalis

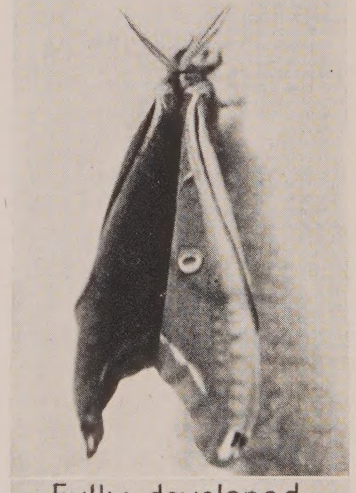
A few minutes after it has left the chrysalis

ALTHOUGH the coming of fall means the passing of butterflies and moths, nevertheless the hobby of collecting and mounting these beautiful creatures is not hampered by a closed season. By merely setting aside his nets and jars and equipping himself with a few small boxes, the collector can still pursue his interesting hobby. During the fall and winter he can, in general, still frequent his same favorite spring and summer haunts with the hope of finding his favorite moths either in the larval or pupal stage.

If the collector prefers, he can gather the caterpillars, in which case he must furnish them with their favorite plant food until they are ready to build their cocoon homes. On the other hand he can wait until they have either spun their cocoons or have crawled into the ground to pupate, according to their habit. If the larvae that he finds is a species that pupates in the ground, it will be easier to gather them before they have burrowed in. In this case they should be kept in a box, the bottom of which is covered with several inches of loose soil. Those caterpillars that spin cocoons might be left in their natural surroundings until they have spun their homes. However, watching the cocoon in the making is well worth the trouble of keeping the caterpillars well supplied with fresh leaves in the meantime.

With a few slight differences, necessitated by the individual type of cocoon, the interesting process of spinning is quite similar in different species. The caterpillar first selects a suitable location for its winter home and proceeds to fasten strands of silk to the branch or twig selected. It then encloses itself in a lacy network of silk, the inside of which it plasters with a saliva-like substance. One end of the cocoon, although securely closed to intruders, is so constructed that when the time comes for the adult moth to emerge, it can do so without harming its frail wings. After completing the cocoon, the larva sheds its skin for the last time and thereby enters the pupal, or resting stage. This discarded skin is always found pressed into a compact bundle in the lower end of the cocoon. The greater part of the life cycle of most moths is spent in this stage. Dur-

The wings on the left open most rapidly



Fully developed

Eye spot on each wing

ing the several months that such moths as the cecropia and the polyphemus spend thus they can neither eat nor even crawl around. But there is no lack of activity within the pupal shell. A wonderful change is taking place. The delicately colored wings are being formed and the dainty fern-like antennae are taking shape. The change is so complicated and striking that one wonders how it is possible for the comparatively hideous caterpillar to turn into the beautiful adult moth.

The cocoon of the cecropia moth is not difficult to find because of its large size and the fact that it remains firmly attached to the tree or bush throughout the winter. That of the polyphemus, however, is somewhat more difficult to discover. It is much smaller and it frequently falls to the ground and is covered with fallen leaves. Even when it remains attached to a twig it is hard to discover until the leaves have fallen. It closely resembles a cluster of dry leaves because the larva first wrapped itself in a few leaves when it began to spin the cocoon. This affords perfect protective coloration. Because the caterpillars hatched from the eggs of the same parent usually feed in a group, their cocoons will often be found in the same general locality not very far apart.

SIDE VIEW OF MALE POLYPHEMUS
Here we see the under side of the wings with the attractive markings

If the cocoons gathered during the fall and winter months are kept in a warm room, the adult moth may emerge as early as the end of February. Unless the chrysalis is removed from the cocoon and inspected frequently, the moth will almost invariably emerge when one is not expecting it. Thus the opportunity to photograph, or at least to watch, the interesting process of wing expansion is usually lost. But when chrysalides are kept indoors, and especially if the protective cocoon has been removed, there is danger that they will become too dry and the emerging adults may be deformed. In order, therefore, to supply a substitute for the natural moisture of snow and rain, to which the cocoons ordinarily are subjected, it is best to keep a moistened blotter in the box with the chrysalides. A shoe box, the lid of which has been fitted with a celluloid panel, will serve well as a container.

After removing the cocoon one can easily tell which chrysalides are males and which are females, for the male has comparatively large antennae and a small body, whereas the female's antennae are small and its body large. With little experience one can readily judge about how soon the adult moth will emerge, because the color of the chrysalis, usually a light brown at first, gradually changes to a dark reddish-brown, and becomes almost black a few days before the time of emergence. At the same time the skin or shell-like covering becomes loose, and crackles like tissue paper when touched lightly. This is the signal to have the camera equipment ready, for when the moth emerges it takes only an hour or so for its wings to expand to their full size.

The accompanying illustrations are of a male polyphemus moth. A white cloth was arranged as a background to which the moth could cling while posing. One photo-flood bulb was the only illumination used and an exposure of $\frac{1}{25}$ second at aperture 12.5 was used for each of the pictures. In order to work close to the moth, the front lens of a cheap pair of binoculars was used as a supplementary lens. This inexpensive lens enabled the camera to be placed about eight inches from the subject. The resulting pictures were three-fifths actual size and were subsequently enlarged to actual size for use with this article.

By the time that the photographic equipment was set in order, the shell of the chrysalis began to split open. First the antennae and then the legs broke through the thin shell. With a few kicks of its legs and a wiggle of its abdomen the adult moth left its chrysalis shell and started to crawl around on the white cloth. At first it looked quite out of proportion, with its body full-sized and its moist, drooping wings not much bigger than its antennae. The latter are fully developed before the moth emerges from the chrysalis shell. After crawling around for a few minutes it settled down in a posture in which its body and the still-folded wings hung downward. While it remained almost motionless in this position, the fluid that causes the wings to expand was circulating. This liquid is pumped into the tiny veins of the wings, and gradually these expand and attain full size.

Shortly after the wings began to expand, it looked as if the moth might turn out deformed, for the wings on the left side were evidently developing much faster than those on the right side. In the end, however, the wings on both sides were the same size. The fully-developed and beautifully-colored moth then shifted its position as if it wanted a profile picture taken also, to show the under side of the wings.

Even after the wings were fully expanded the moth was not quite ready for its first flight because its wings were still weak and flexible. It had to wait a few minutes longer until the fluid that stretched the wings would harden and thereby give to these once limp and flimsy wings a certain amount of strength and stability. But this particular moth never got a chance to test its wings, because it was des-

tined quickly and painlessly to become a mounted specimen.

A piece of corrugated cardboard covered with cellophane is an excellent mounting board for those who prefer to mount moths back downward. The cellophane covering is used because its extremely smooth surface will not rub the hairy scales from the wings or body of the specimen. After the moth has been pinned through the thorax, its wings are spread out in the conventional position so that the lower edge of the fore wings forms a straight line perpendicular to the body. The wings are then fastened down by pinning several narrow strips of cellophane over them. During the week or more that the moth is drying on this board, and especially after it has been placed in a permanent collection, great care must be taken to prevent its being infested with insects that will destroy it. A small quantity of paradichlorobenzene placed in the mounting case will kill any insect that may enter it.

MOUNTING OF POLYPHEMUS AND EGGS
Female above, male below; the eggs, about 225, comprise a single laying

In the mounting of large moths, the viscera and eggs should be removed from the abdomen through a small slit made in the underside. The body should then be stuffed with a small wad of cotton, and the skin worked back into position with a pair of tweezers. The opening need not be sewn shut. If this is done the body will retain its normal size and shape and will not shrivel up as it would were the eggs and viscera left to dry inside the body. The eggs can be glued to a piece of black paper and displayed with the female from which they were taken.

But all of this is the story of a moth captured while in the caterpillar stage, or after it has spun its cocoon. If it had not been taken by the collector it might have fallen prey to some bird, or some insect parasite. If, on the other hand, it had escaped these dangers, it would have remained in its cocoon until the following spring. Then a day or so after it had emerged, it would have found a mate and done its share to preserve its species. The female would have laid from 200 to 300 eggs within a few days, usually on the leaves of some favorite food plant. Then, after a week or so, the eggs would have hatched and the young caterpillars would have begun to devour the tender leaves of the food plant. In the meantime both the male and female parents of these larvae would have died. The larvae would grow rapidly and shed their skins four times, the last time inside the cocoon. In this manner one life cycle of such moths as the cecropia or the polyphemus would be completed, and once more cocoons would be awaiting the searching eye of the collector who pursues his hobby the year round.

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COLORED RAINDROPS

By ROSE D. KOSCHÉS

A hundred million raindrops fell
In glittering colors past our door,
And each one had a tale to tell
That held me there like ancient lore.

They knew when first the world began
And waters then were everywhere,
They knew the infant God called man,
Before he thought of worldly care.

And when his plans began to form
They watched his cities rise and fall,
They've been the colors in the storm
And danced in Nature's banquet hall.

They've seen the thirst in torrid lands
Where rain means more than precious gems,
Where people beg with outstretched hands
And plant life droops on withering stems.

They've lain as flakes on mountain peaks
And skipped around as drifts of snow,
Then slipped away to whispering creeks
When frozen ice began to flow.

They've been the drops in endless rain
That doesn't cease for days and weeks,
And made the swamp lands where they've lain
A place where rising vapor reeks.

And then I saw the rich, black sod
That covers all my flower beds,
I saw the handiwork of God
In yellows, blues and brilliant reds.

I knew what blessings raindrops held
I saw their never ending ring,
I saw them tie and firmly weld
The winter with each new-born spring.

DEPRESSION FUR

By TONY LASCELLES

Illustrated by Russell O. Berg

LOUIS was busy sorting fur when I visited his trading post in the northern winter wilderness. A strange assortment of pelts stripped from the bodies of the lesser forest people strewed the warehouse floor; pelts, for the most part, disdained as articles of trade in days when dog teams came from beyond the height of land drawing toboggans piled high with bales of more valuable fur. And among them, a number of familiar skins caught my eye. It was difficult to believe that they could be part of a trader's requirements, but there was no doubt regarding the species of animal they once clothed.

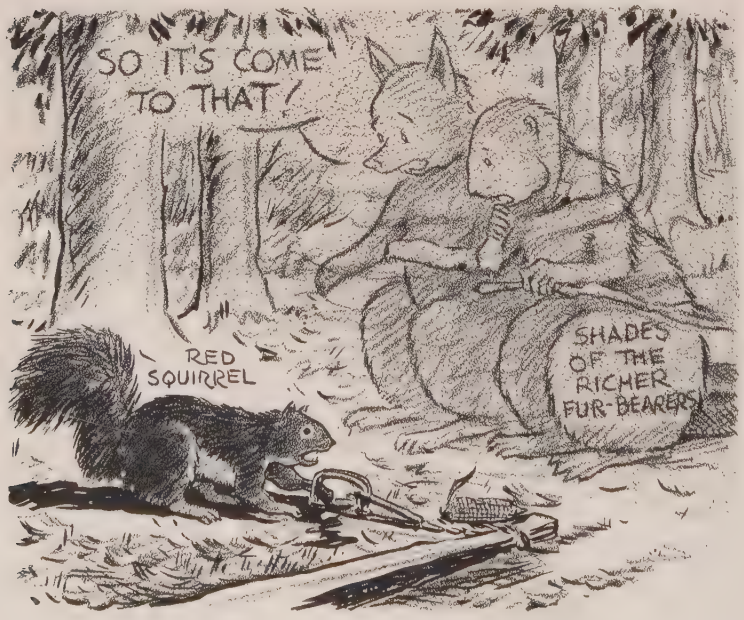
I turned to my companion, a first Canadian, in astonishment. "Surely these little pelts can have no value," I said. "Sure," he replied, scornfully, thinking no doubt of happier times when the forests were generously inhabited with worthwhile creatures. To this Louis added, "Yes, they are in great demand, even if they do not amount to much. But what odds, if the retail trade can use them?"

Believe it or not, "Chatterer" the red squirrel, of bedtime story fame, takes another bow, for it was the humble pelts of his kind to which we referred. Yes, the saucy roisterer of the tree tops, the friend of children during vacation days in the woods, and the camp company of lonely travelers in the wilderness, has been elevated to monetary importance.

Strange things have happened in the history of the trade in forest fur, events filled with the popular conception

IN THE DEATH HOUSE

of glamor and romance, but the woodlands and silent places of the near north could provide material for no story more pregnant with meaning than the cleanup of the cheery red squirrel wherever it occurs within reach of the haunts of man. Farmers, rural school boys, woodcutters and amateur trappers, incited by radio calls for help, are out to swell the bales of pelts awaiting shipment to the fur marts of the world. Traps and small bore rifles take the toll, and even sticks are not disdained as instruments to take the life of a victim caught in deep snow away from the sanctuary of sheltering evergreens. One may find their naked carcasses left to pollute the clean air of spring about the trees in which they lived, the remains of an animal as easily slaughtered as a friendly domestic cat. There is little one can say in extenuation when vanity, rather than necessity, provides the motive virtually to exterminate a mammal with a wilderness duty to perform.



Twenty cents, or thereabouts, is the incentive to destroy a red squirrel; twenty cents to kill and skin, and stretch the pelt of a creature whose fur has actually no greater value than the fur of its cousins, the ground squirrels, or its distant relative, the domestic rat.

Yes, the red squirrel is likely to go the way of all fur; the way of every furbearer with a price on its pelt, whether it is worth a nickel, a dime or a larger piece of silver. At the present rate of destruction, if what I saw is

any index, few red squirrels will inhabit the forests and woodlands near northern civilization when the snows of another winter melt to the ground. And what few survive will create the nucleus for further slaughter, until the day when the "sentinel of the woods" will cease to exist. That is, unless a friendly government intervenes, or the trade decides to erase the name of "Chatterer" from its list of fur, which is hardly possible as long as one remains alive.

There is, of course, more to this story than appears on the surface; more besides a discourse regarding the esthetic and economic value of the red squirrel to the forests and woodlands of the near north, or the narration of another wilderness tragedy staged by predaceous humans, stimulated by the desire for paltry gain. It is only when regular commodities are scarce and famine looms ahead that useless substitutes appear. And so the pitiful little pelt of the red squirrel of bedtime story fame, once scorned as a commercial fur bearer, "comes into its own", because the worth-while fur bearers, victims of excessive exploitation, are no longer able to satisfy the pressing demands of a market whose voracious appetite cannot be appeased from what was once the usual source of supply.

But perhaps the end is not in sight and the trade in wild fur may prosper in the aggregate for a year or two from the pelts of the "little people of the wild", for my Indian friend said in parting, bitterly: "Soon white man trap the chipmunk and the wood mouse and other tiny fellows who live among the tall grass of the meadows and beneath the forest floor." Whether his remark was intended as sarcasm or truth, I do not know. In any event, when fashion decrees, milady, even in midsummer, must be "suitably" adorned! Depression fur—what else could the pelt of a red squirrel be?

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Sweet Vernal Grass

By
F. LAMSON-SCRIBNER

Photographs by the Author

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SWEET vernal grass was named by Linnaeus. Because of the decided yellowish color of its flower heads, he called it *Anthoxanthum*, a combination of two ancient Greek words meaning "yellow flowers". Because of the delicious fragrance of its stems and leaves, he added *odorata* as a specific name.

This grass has travelled far from its native land, since the days of the great botanist who first saw it in northern Europe, and the name now appears in the Floras of many countries in the eastern and western hemispheres.

This is among the earliest grasses to brighten meadows and pastures with springtime verdure and in its own country it is most widely known as sweet vernal grass, referring to its fragrance and early development.

It is the perfume of this grass that attracts and led to its popularity with the seedsmen of Europe, whose words of praise of its pleasing qualities carried it far afield through Eurasia, Africa, North and South America and Australia. Yet its usefulness is doubtful since it makes no lasting sod, is outclassed for hay by many meadow grasses, and its life is limited to one or, at most, two years.

A near relative, *Hierochloe,* Holy grass, is spoken of with reverence in northern Europe where it is used on

SWEET VERNAL GRASS
A clump of this fragrant but economically unimportant grass, and detail of the head of one stalk

festival days for spreading before the doors of churches. It is native in the northern United States and its fragrance is the same as sweet vernal.

This "Holy grass", better known in this country as "sweet grass", has the same specific name, *odorata.* Its roots are creeping and perennial; it is longer-leaved, and its head, instead of being closely crowded with flowers and elongated, has few and widely-spreading branches. The northern Indians use it for making small fragrant boxes or baskets of ornamental design.

Some members of the glassware menagerie. At the top a dolphin holds a shell-shaped dish on its tail. Then a lion guards the top of a covered dish. A frieze of "Teddy-bears" dance around the rim of a platter with Theodore Roosevelt's picture. Two graceful swans float on top of a pair of rare Sandwich glass dishes, highly prized for their beauty, although they also hold candy. Note the bubble in the neck of one of the birds. This is an imperfection common to this old glassware

A VARIED GROUP OF GLASSWARE, EACH ONE WITH A NATURE INSPIRATION

The lion serves as a paper-weight; a dog holds a toothpick holder hat; a bear is a mustard jar; a monkey on a tree stump is a match holder; a frog holds a shell toothpick holder and a bird is a salt dish

Grandmother's Glassware Zoo

When pressed glass became popular a century ago designers turned to Nature for their inspiration

By BESSIE M. LINDSEY

It is not necessary for one to visit South American jungles to experience the thrills of adventure and discovery. For several years I have searched for elephants and monkeys, lions and deer, bears and bison—right in my own community. I have met with considerable success, and my collection of "specimens" is growing almost daily.

As a child I had an "extravagant interest" in the outdoors. As an adult I have an "extravagant interest" in attractive glassware. Always I have had an "extravagant interest" in pictures. Combining these interests, I have filled holidays with decidedly pleasant hours, and have acquired precious memories.

When I am driving through the country, a watchful eye is kept for any sort of shop where antiques, or things "a little used, but not abused" are sold. From the wilderness of objects offered for approval, many really fine pieces of old pressed glassware have been gleaned.

Glassware was brought within the price range of the average individual when the process of pressing glass superseded the art of blowing glass about a century ago. Fine glassware cost so much less that almost everyone could afford to own some of it—and did. The business expanded rapidly, and pattern-makers were called on to provide new and interesting ideas for decoration. They proved equal to the demand, and turned to many sources for subject material. Nature was prominent among their sources of inspiration.

Landscapes and seascapes were used. One of the most popular designs of this type is known as the Cape Cod pattern. It consists of three panels, arched at the top, each one showing an attractive rural scene. Between the panels, sprays of ivy, with berries, are shown against a stippled background. Three more such panels are on the domed cover.

Dewdrops and raindrops were fashioned into sparkling designs. One of my prizes is a dewdrop pattern, a shallow oval dish that is a duplicate of one owned by President and Mrs. Lincoln. Theirs is now displayed on the buffet in the dining-room of Lincoln's old home in Springfield, Illinois.

Fishes added a popular touch, the dolphin being used to ornament candlesticks, lamps, dishes and match-holders. The dolphin idea, however, was not original with American pattern-makers, since Venetian, Holland and English glass workers had used this type of decoration. One dish in my collection shows a single dolphin, holding on his tail a shallow, flaring, shell-shaped dish. It is opalescent in color. Other dolphin dishes have frosted twin dolphin bases.

Shells offered interesting ideas. Shell-shaped sauce dishes were made, and shells were fashioned into various attractive designs for all sorts of tableware.

Frogs, alligators, turtles, lobsters, monkeys, opossums, squirrels, rabbits and dogs made a substantial addition to grandmother's list of "what's new in glassware". Three interesting toothpick holders are among my "finds". One shows a frog holding a shell-shaped receptacle. The second presents a monkey climbing a tree stump, and the third is of a dog holding the brim of an upside-down-hat in his mouth.

Lions, bears, deer, bison and elephants contributed their share towards decorative design. The deer and bison are found in a glassware pattern of distinctly American appeal, called Westward-Ho. This is probably the most

A GROUP OF SANDWICH GLASS SALT DIPS

Here birds predominate. Below is a platter with the interesting "frosted stork" design

sought for, of all the old pressed pattern glass. The frosted design is in relief. It shows the two animals and a pioneer's cabin. The knob on all covered pieces is in the shape of a crouching Indian. Mrs. Alfred M. Landon of Kansas treasures a notable collection of this glassware.

Any dish in the lion pattern is a choice collector's item. It, too, is partly frosted. The frosted base shows the King of Beasts in a reclining position. The knob of the lid is a large frosted lion, but on some forms it is seen as a lion head only. A group of lion paperweights, found frosted or clear, is in harmony with the lion dishware.

Bears are represented by a mustard jar, showing Bruin sitting on his haunches, paws drooping passively across his tummy. His head, forming a lid, lifts off. Bears are seen again on a glass platter that "honors" Theodore Roosevelt. Twelve of the "Teddy-bears" dance around the rim. The platter also shows the "big stick" that enforced the "square deal", the Rough Rider's hat and guns, the American eagle; and a frosted glass likeness of the President in the center of the platter.

Swans, storks, eagles, pheasants, owls and many other birds, were used as ornaments. Everyone appreciates birds, so bird decorations were in high favor. My most cherished piece in this class is a rare Sandwich clear-glass swan with frosted neck and tail, red eyes and bill. A frosted stork bread platter is almost as pleasing. Three storks are seen as the central feature of a swamp scene. Another bird item much collected today is the Sandwich bird salt. The small dish is in the form of a bird. An opening in the top of the body furnishes a receptacle for salt. These are found in clear, blue, yellow and amber colors, so that an assortment of them provides a colorful group.

A table-set of frosted and clear glass, in a pattern called Flower-Band, includes goblets and pitcher, sauce dishes, compotes, sugar-bowl and cream pitcher, spoonholder and celery-vase, butter-dish and jam jar. My twenty-one pieces have been collected from five different states. A frosted band of flowers, or fruit, encircles each dish. A spray of oak leaves, with acorn, is on each footed piece; a pair of frosted love-birds, with bills close together, forms the knob of each covered piece. The goblets are especially dainty, the stems being a spray of lilies-of-the-valley.

Butterflies, grasshoppers, even snakes, had something to offer in the way of decorative value, for grandmother's glassware. Flowers, leaves and vines were used . . . But these growing things tell another and a separate story.

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Among the interesting and timely features in Nature Magazine next month is one of Archibald Rutledge's outstanding stories, in which he tells of various animals that post sentries to warn of the approach of enemies. E. E. Stanford writes interestingly of the evergreens, and Henricks Hodge tells us of the Passion Flower and the Crown-of-Thorns plant. December is rotogravure month, also, with sixteen pages of remarkable pictures.

TRAVELER'S TREE

By EDNA P. HOFFMAN

A FRESH drink of water, food, and material to build a house, all grown on the same tree, sounds more like a fairy tale than a scientific fact. Nevertheless, the traveler's tree, a native of the sunny hillsides on the island of Madagascar, supplies all three.

The tree has been successfully transported from its homeland, thriving in Florida, South America and in many other warm regions of the new and old worlds.

Growing best in well drained but moist, rich soil, the tree provides an unusual and beautiful addition to any American garden. The plant is a product of the dank tropics and the dark, mysterious jungles of hot, sunfilled countries. Unlike many of the tropical plants, it is a friend to man. Old records tell us that many a thirsty explorer owed his life to a fortunate meeting with the traveler's tree.

A UNIQUE TREE FROM MADAGASCAR

This interesting plant not only houses a water reservoir to slake the weary explorer's thirst, but supplies the natives of the island with food and building materials. The plant pictured here is growing at the author's Florida home

Although the tree is often called traveler's palm, the plant really belongs to the banana family. Its scientific name is *Ravenala madagascariensis*. "Ravenala" means, literally, "leaf of the forest" and the hills of Madagascar are thickly covered with the rich green fronds of the traveler's tree.

The broad leaves of the tree are distichous, that is, there are two rows of them growing parallel, back to back, from the tree trunk. They are arranged like huge fans, sometimes growing to be thirty feet tall. When the tree is young the leaves resemble two huge green fans growing directly out of the ground. As the plant grows older and the first leaves drop away, a large palm-like trunk grows upward, crowned by waving fans of deep green foliage atop slender yellowish stalks.

Each leaf stalk is six or eight feet tall and about as thick as a child's wrist. The broad leaves are from four to six feet long, more than a foot wide, and are a deep, rich green in color.

How do travelers get water from the tree? The answer is simple. The edges of each broad, thin stem curl together, making a neat, covered trough. An oval opening at the top of the stem, just above the point where the leaf begins, leads into the trough, and a covered storage place at the other end holds the water. All the moisture that collects on the broad leaf quickly slides downward into the opening, passes through the hollow stem and comes to rest in the reservoir. There is no filtration of this water through the tree trunk.

By thrusting a knife blade under the stem, close to the place where it joins the parent trunk, the thirsty traveler is rewarded with a stream of cool water. The trees always grow with their broad sides facing north and south and their edges pointing east and west. This lessens the rate of evaporation of the moisture on the leaves.

The flowers of this tree look much like those of the banana. They are supported by large bracts and arranged

A POKE WITH A KNIFE DOES THE TRICK

The thirsty wayfarer is rewarded with a stream of cool water by merely inserting a knife under the stem close to the junction with the parent trunk

in two rows along the stalks. The seeds, which are contained in hard woodeny pods, are good to eat. The seeds are about the size of small beans and the pods are covered with a bright blue cottony fuzz. When pressed, the seeds yield a rich supply of oil.

In Madagascar the plant is sometimes called the builder's tree as the natives use it extensively in constructing their homes. They use the broad leaves for roof thatching and, by laying them thickly over the sloping rafters, they have a snug, waterproof covering. The tree's hollow stems form the house walls and the room partitions. When the bark is beaten flat it serves as flooring.

This plant is certainly a friend to man, providing him with water, food and shelter. One would search far to find a plant more useful than the traveler's tree of Madagascar, a place of many interesting plant growths.

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THE PIRANHA IS THE MAN EATER OF THE AMAZON AND ITS TRIBUTARIES

The shark and barracuda of the open ocean are mild in comparison with this ten-inch river bulldog. A school of these fish will attack a man and reduce him to a skeleton in a few moments.

The Man-eating Fish of the Amazon

By ARTHUR H. FISHER

WHEN one's mind turns to man-eaters, we naturally think of lions, tigers, or perhaps the great white shark. We would be unlikely to consider fish from eight to ten inches long in this deadly category. However, we do not live in the great Amazon Valley of equatorial Brazil, where the rivers and streams fairly teem with the most blood-thirsty variety of fish known in any part of the world. This is a true man-eater, and at the first sign of blood, attacks with an amazing frenzy.

This piscatorial bull-dog is the piranha, which abounds in large schools in most of the streams of the Amazon Valley. It rarely exceeds ten inches in length, but what it lacks in size is made up in savagery and numbers, for these schools will attack any warm-blooded creature, whether it be a child, a man or a full grown bullock. Many a poor unfortunate native, caught unawares by these creatures, has been reduced to a skeleton, and those who read Theodore Roosevelt's book, *Through the Brazilian Wilderness,* will recall that one of his native porters was badly mutilated by these fish.

The piranha derives its name from two Tupi Indian words, *pira,* meaning fish, and *anha,* meaning tooth. It is well named, for the mouth is equipped with a double row of sharp, shark-like teeth so arranged that the undershot jaw renders them capable of cutting off a human finger at a single bite. For this reason, if you are travelling by canoe in the tributaries of the Amazon, it is never safe to dangle your hand in the water, for without warning you may lose one or more digits. This very thing happened to the director of the Goeldi Museum at Para some years ago, and while I was personally making motion pictures of these fish in the Amazon country, a native assistant lost most of his thumb while transferring one to an aquarium I had constructed for the purposes of photography.

WHO KNOWS?

By what right does man assume such superiority over animal kind asks

STEPHEN HAWEIS

Illustrations by R. Bruce Horsfall

IT IS THE FEROCITY OF THE SHARK, NOT ITS GRACE AS IT SWIMS, ABOUT WHICH WE HEAR

ROGER BROOKE observed that when man speaks with the voice of God it is not often to bless. When he speaks from the dizzy altitude of his superiority over the animals it is more often to emphasize his difference than to establish his similarity to them. People express themselves about animals chiefly in terms of fear unless, having a faint familiarity with one individual of one species, they claim that their pet "knows everything you say to him" and has a subtle gift of perception enabling it to penetrate the inmost recesses of a visitor's moral nature. Otherwise it is the horns of the cow, the teeth of the brute, the ferocity of the shark—never of the loving disposition of the cow, the beauty of the beast or the grace of a shark as it swims, that we hear. Animals are merely automata, without reason in any degree, far less any such thing as a moral nature.

Occasionally the behavior of an animal is so like a good human reaction to circumstance that we murmur a little about inherited characteristics; instinct. The simple soul merely remarks "Ain't Nature wonderful?" and lets it go at that. But who knows? It may be that reason and every other human quality may exist in the animal world in varying proportions, as they exist among us. There is no evidence upon which to base proof, but the likelihood that we alone of all creation have every quality, and all others are senseless machines, comes near to a belief in miracles that many of us do not profess. "Animal" is still a term of contempt, but it may be remembered that it is not so long since if a man were not a Christian he was no more than a beast to his more enlightened brethren. He might be robbed and murdered with impunity. See that beggar over there? Pass me your arbalest: I bet I could knock him over from here!

"Oh bravo—that's a pretty shot!"

Old world stuff—the arbalest was a cross-bow—but the feeling persisted well into the age of firearms and I hazard that even apart from the legitimate slaughter, justified and enforced by war, there are living today men who have "taken a shot" at a Negro, an Indian, or a Blackfellow in the wilds of Australia for no better reason than that he happened to be there and that the Christian was lucky enough to have a rifle in his hand at the moment. Outside the reach of the law one does not know how men behave; we are not quite sure how we would ourselves behave with complete immunity from punishment.

When we say that somebody behaves like an animal, it is fairly safe to say that we mean he is behaving as no animal ever behaves. In gluttony, cruelty or the indulgence of any primitive appetite the animal usually behaves far better than human beings. The animal eats to satisfy his need, kills without malice, and all its functions are regulated by the law of time and necessity, although it is possible to find occasional examples of senseless behavior—just like our own. The dog tribe sometimes kills for sport alone; hunting fish, in a huge shoal of helpless prey, occasionally snap to right and left, killing long after they are glutted with food. Blood-spilling is well known to create abnormal conditions in the human being, whether he has been bayonetting his neighbors or slaughtering beasts in an abattoir. Indiscriminate slaughter, however, is not characteristic of any animal except man—the possessor of higher and nobler instincts, ruled by undoubted reason.

Whether we believe that animals think or not is for most of us an emotional rather than a scientific question. Instances of apparently reasoning faculties are so common among higher animals that even the hard-shell scientist softens his chitinous denials with a murmur of kindly scepticism, realizing that the alternative, which he is compelled to believe in the absence of fuller knowledge, makes his explanation rather harder to swallow than the miracle he denies. Animals behave in so regular and predictable a fashion that we explain it by "instinct" —among men we should regard the same conduct as indicative of obeying the law of our kind perfectly. Man alone has voluntarily created standards that are obviously

not always advantageous to us. Where the results emphasize their unsuitability to our needs he attributes a nebulous reward in some future life. There is hardly any grotesque self-torture that man has not practiced upon himself, and his neighbors, in the resolute conviction that it was right, however much it might appear to be otherwise. No animal ever lies for years upon a bed of thorns, or remains motionless for years with one paw in an unnatural position until it atrophies. The animal that breaks a fundamental animal law is killed at once, and if it goes into solitude, deliberately abstaining from food, it proves the wisdom of natural law in the simplest and most direct manner.

Looking down upon humanity, a super-human, or super-animal, might wonder just what satisfaction or result the Hindu fakir expected from his nail-studded couch. He might wonder why the vastest and most beautiful buildings seemed to serve no purpose for six days in the week, while thousands remain inadequately sheltered. Seeing congregations assemble to sit in rows, to kneel, or to sing, might suggest no motive to one who was ignorant of it. He might observe the same old gentleman in the same window seat of the fashionable club day after day, making no movement but a slow opening and closing of the mouth—and might compare it with the behavior of a large fish which does the same thing, hour after hour. One, we know, is a philosopher meditating upon great issues; the other, we are equally sure, is doing nothing at all. This one is praying silently, that one is not—but just why are we so very sure, since there is no possible proof of either but our own private conviction—which is not evidence.

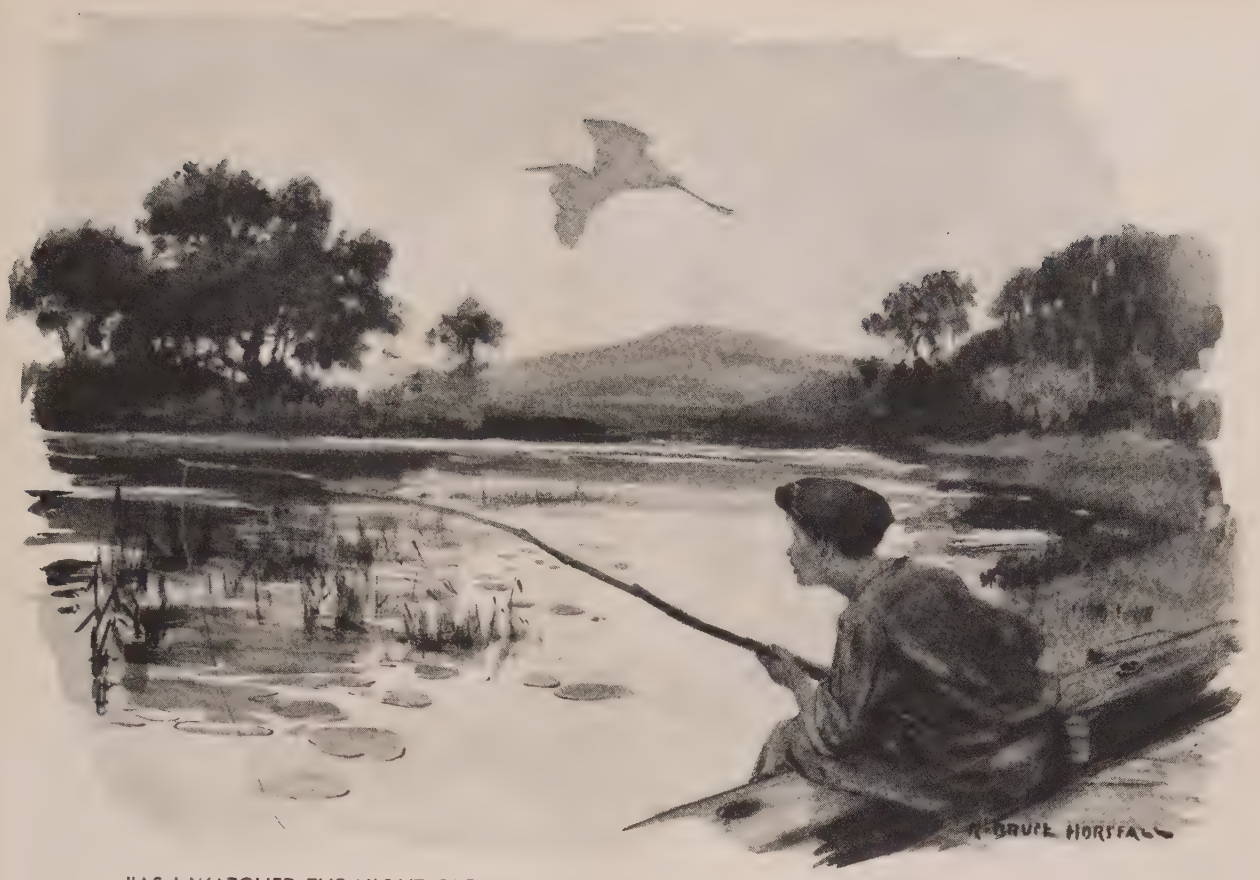
ROOKS ARE CREDITED WITH GIVING A FAIR TRIAL TO ONE OF THEIR NUMBER WHICH HAS COMMITTED A CRIME

From the great eminence of avowed ignorance our super-animal might regard a political convention as a totally inexplicable phenomenon, recording it merely as the antithesis of the peculiar behavior of an anchorite. The moral attitude, the civic sense of duty and conscience have no definite signs or sounds that it can interpret.

In the animal world there are many strange and unexplainable phenomena for which no zoologist can see any reason, and which no taxonomist attempts to classify. We do not know why certain species of crustacea assemble in large numbers at certain seasons. The march of land-crabs we assume to be for mutual protection during their migration to the breeding places in the sea, but it may not be only for that purpose since lobsters occasionally march in the sea in almost regular ranks and in water which is certainly not suitable for breeding. I have seen them by thousands in two feet of clear water marching upon white sand without a rock for a hundred yards. We know nothing about the periodic parade of the lemmings in Norway that often terminate in wholesale destruction in the sea. How can we explain the occasional vast increases among rabbits in certain years? Wolves and many other animals gather for apparent assembly and discussion. Rooks do so in their trees and are credited with giving fair trial to one of their number which has committed crime—nest-robbing—after which the criminal is killed in the most human manner.

Few try to explain the singing of birds beyond suggesting encouragement to the sitting mate. The singing, however, is not done close to the nest, nor, where the male takes his turn at incubation, does the female make any effort to sing or to recite amusing stories to while away the hours—so far as we know. We see the annual massing of the migratory birds, but why they fly in strange formations, executing complicated aerial dances, we do not know. There is in Nature far more of the singing than is necessary for the incubation of eggs; who knows but that it may be something more that makes a bird sing with such fervor that it suggests passion, and, perhaps, religion? We know why we build cathedrals, but we do not know why birds make mock nests, and why the bower bird constructs its bowers that serve no useful purpose that we can discover. The ecologist can point to a thousand instances of curious and unexplained habits, but the primal instinct of religion, which we find in the most primitive of our own kind, never suggests itself to him as a possibility.

We do not know exactly where life begins any more than we are sure where it ends. We do not know precisely where instinct ends and reason begins or how moral theories originated. We do know, however, that there is a wide difference in physical and moral outlook between different types of human beings; that some are actuated far more by moral principle than others; that many human creatures' lives are so simple that their daily reactions might occur almost (Continued on page 309)



"AS I WATCHED THE NIGHT CREEPING OVER LAND AND WATER, AND LISTENED TO ITS VOICES, A HUGE BIRD SUDDENLY BECAME VISIBLE IN THE DARKENING SKY."

The Mountain Heronry

By EDWARD A. PREBLE

Illustrated by R. Bruce Horsfall

On a July evening many years ago I sat on the little bridge that still spans the outlet of Archer's Pond. The sun had already set beyond the New Hampshire hill whose rugged brow—The Ledge—surmounting the steep, tree-clad slope, seemed almost to overhang the lakelet. Ages ago a glacier had overspread that broad-topped hill, pushed over the margin of the mighty rock that formed its backbone, and sent its slow-creeping flood of ice down the steep incline with a force so stupendous that its front gouged a deep furrow in the vale below. When the ice had ceased its advance and slowly melted beneath the increasing warmth, a long ridge of sand and gravel, ground from the massive rock and pushed forward, made a dam that held the long narrow lakelet back against the steep-sided mount. What was the original depth of that ice-born tarn no man knows, for the oozy mud that nearly fills its bed has never been plumbed.

The purple shadows were lengthening and the details of the forested slope and the surface of the pond grew each minute more obscure. Even the starry flowers of the lilies scattered among the broad floating leaves were fading from my sight. From about the lakelet there rose on the still night air those sounds that are so much a part of a New England pond that they seem its own voices. A bullfrog a little way down the shore started a deep-throated chant that was borne to the ears of the farm people a mile up the valley. Occasionally a bream or perch snatched some morsel floating among the lily-pads and, attracted by the faint splash, one could just discern a circle of tiny wavelets ripple the glassy surface. A louder splash near the opposite shore told that a pickerel, nosing its way along the shallow margin, had seized a fish or a frog. Over all surged the low hum of myriads of dancing water insects, humble parts of the varied chain of life.

As I watched the night creeping over land and water, and listened to its voices, a huge bird suddenly became visible in the darkening sky. The long neck, so disposed in a double fold that the bird's head seemed to rest on its shoulders, and the legs that trailed straight out behind like a rudder, marked it as a great blue heron. Its broad wings were flapping deliberately, but with a power that carried it swiftly on its way. Almost as I caught sight of the bird, it set its wings and sailed gradually down to the pond, so skillfully shaping its course that, seemingly

without effort, it skimmed closely several hundred yards of the surface, and alighted silently in the shallow water of a wooded bay. Evidently it had just come from some nesting place in the mountains for a night's fishing.

Thus the two of us, boy and heron, had paid this evening visit to Archer's Pond for the same elemental purpose. We were closer akin than either of us knew. The bird had come in obedience to the call that predominates among the primal instincts of living creatures, the urge to prolong its own life, and to provide for the young that would perpetuate its species. Much of the same feeling, although I did not sense it, was responsible for my own presence there, for one of man's earliest pursuits was fishing, and within most of us there still persists a germ of this primal heritage.

If the heron was aware that a potential enemy was watching him, he gave no sign. My own fishing was neglected, and I watched his every move as he stealthily waded the shallows, and gathered in what the pond provided, fish and frog and insect.

When the gloom had grown so dense that the alert form was no longer visible, I shouldered my fish-pole and slowly made my way homeward, enjoying the coolness and glamor of the summer night, and leaving the heron to pursue its fishing alone. But the memory of that great bird, fishing at dusk by the lovely pond, stayed with me, and I longed to find its nesting place, and learn more of its life. It had come from the general direction of the hogback to the northwest, but I felt sure that no herons were nesting in those nearby hills. So I asked Grandpa William, whose mountain lore seldom failed me, where the bird's home could be.

"Oh—them blue cranes," said the old man: "Why, they build in the tall beeches on top of Thurley's Mountain, the other side of Dan Hole Pond. Anyway, they used to, and they love to stick to the same place. If you think you can stand the trip, we might go up there some day."

Now the sight of a "blue crane" rising heavily from the margin of a shallow pond, or from among the willows beside a meandering trout brook, was not a rare experience to one who so persistently haunted the wilderness as I did, but the sight of a nest was an unfulfilled ambition. I could imagine no trip too hard or too long if at its end I should see the nests of these great birds. A tramp over the hills to Dan Hole Pond and the mountain beyond called for no special preparation, and early one morning we set out.

To the old man each mountain road or trail was as well known as though it were a highway. We followed an old woodroad that led through "The Gulch", a deep ravine from whose cavernous depths came one of our best trout brooks. What words can picture the beauty of a summer morning in the mountains of New England! Hermit thrushes, vireos, and warblers voiced their hymns of praise from the woods; from the towering roots of a century-old pine stump in the fence, in a hollow of which his tender young were sprouting their flight feathers, a bluebird warbled his love-notes; here and there a yellow-throat scolded from the moist thickets. As we passed through the gulch we caught a glimpse of a huge porcupine as he scuttled to his sheltered cave. In the depths of this valley the junco loves to nest, and now her mottled young were trying their new-fledged wings. A black-throated blue warbler sang from a maple bough his *zee-zee-zee,* such a strain as an insect might claim, did one not see the real artist. And so we crossed the first ridge, and came to the banks of the stream that carries to the Saco the clear water of the Dan Hole Ponds.

Years before the first pioneer farmer blazed his way up the valley to these lovely lakes, tradition tells us, a trapper from down-country, Dan Hole by name, came here each winter with a pack of trading goods, and trapped and bartered with the vanishing Pequakets. His methods and manners were fair and the Indians liked him. Then the fisher and marten abounded; each spring he hid his traps in a dry cave and took his pack of fur back to the settlements. Dan Hole and his Indian friends, and the white settlers who followed him, are long since in their graves, but the trapper's name is still perpetuated in these lovely twin ponds, despite ill-judged efforts to replace it.

The higher mountain slopes that border the basin in which nestle the lakes of Dan Hole were then yielding to the saw their virgin cover, and a busy little community found support there. Through this we passed and entered the logging road down which had been dragged the great trunks of spruce and pine. Above this trail hung the supple drooping boughs of striped maple and broad-leaved viburnum. In the woods on either side the white star-flowers of dalibarda, the lovely pink-veined blossoms of the dainty wood-sorrel, and the erect spires of the wintergreen or pyrola were mingled on carpets of yielding moss with the glossy leaves of the trailing arbutus, whose sweet bells had long-since fallen and given place to seeds. As we climbed, the spruces were more frequent, and here and there an olive-backed thrush, a bird unknown to the lowlands, poured out his simple song, while in the more open spots the hermit thrushes and white-throated sparrows—for they, too, love the heights—sang for their mates.

But where were the herons we had come so far to see? Well, they were near the top of the mountain, and we should reach them in good time. And I was content, for who would not be while following a summer trail to the summit of a New England hill?

Finally, from a group of tall beeches a little to the right of our path came a series of hoarse squawks, and a number of great birds flapped heavily from the tree-tops, and there, sure enough, were the nests—great masses of dry sticks lodged in the boughs of the beeches, some in forks, but mostly far out on the slender limbs. They were all around us, sometimes five or six in a tree, sometimes alone.

In May, when the leaves of apple-green were unrolling from their swollen brown-scaled buds, the birds had come, and had patched up the old nests that had been

the nurseries of many generations of awkward young herons. With the veterans had come young birds, to essay their first nesting, and add new homes to the colony. Then, in June, the month of egg-laying and brooding, each mother had sat patiently on the big blue eggs until the young broke their way out to a world of swaying tree-tops.

It was July already, the month of long flights to fishing grounds, for the nearest points where food for the young was surely obtainable lay in the valley nearly two miles away, and some of the herons, like the one I had seen at Archer's Pond, would have to take an air-line flight of five miles ere they could settle to their fishing. But soon the young could leave the nests and start fishing for themselves, and the whole colony would leave their mountain-top and move southward, seeking the broad swamps of great river-systems where fishes, frogs, and salamanders had populated the warmer waters with the fruit of their spawn.

How I wish that the rest of the story might be different —for the nests were empty! Newly-felled trees, shattered nests, and festering bodies of slaughtered birds told plainly a bloody tale. A few days before, a gang of sawmill hands, intent on a holiday, had marked from the valley below the place where the great birds, laden from their fishing, had settled on the mountain top. Thither climbed the horde, laden with guns and axes, and plied their murderous task until the last of the young birds, and all the old ones whose anxiety for their helpless young had drawn them within range, had been killed. Probably resentment toward the birds because they ate the small pickerel of Little Dan Hole contributed to the motives that urged this devastating raid. Fifty years have flown by since that day, but a few of the men who formed that thoughtless crew still remember the trip of slaughter and wonder why they took part in that murderous foray.

Many changes have come to Dan Hole since those days. The virgin forest that once supported a populous community has vanished, but Thurley's Mountain still clothes itself with verdure, and as one traces the old road down which logs were once hauled, the olive-backs and the hermits still greet him as of old. With the passing of the intensive industries that peopled the region summer and winter, some of the larger wild creatures have come back. The bears revel in the raspberry patches that mark the more recent of the cuttings, and the timid deer, unknown here in our boyhood days, leaves his pointed track in the sandy shallows of the trout brook.

Pickerel still hunt the shallow margin of Little Dan Hole, and trout are planted there, and form an attraction. Perhaps, if the heron colony were there now, its members might be recognized as valuable agents in maintaining a better balance between pickerel and trout, for the pickerel is considered an enemy of the more favored species. Herons eat many other enemies of the better fishes—the predaceous larval forms of water beetles and bugs and dragonflies that prey on young fishes. Other fishes eaten by herons are the destroyers of the spawn of trout and other game species. But the herons never again nested on Thurley Mountain.

All in all a more kindly sentiment toward even those wild creatures that eat what we covet is growing among our people. To kill a heron without specific permission is unlawful, yet many people do not know this, and only an occasional lone bird now fishes the shallow margins of Dan Hole or Archer's Pond. Many of us wish we could see one oftener. One of these great birds alive may contribute more toward the state's prosperity than is suspected by the publicity organizations, or is within the ken of those in charge of fish and game.

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WINTER TREES

By MILDRED H. SISSON

I am in love with winter trees:
With elms that lift their branching heads
Like antlered deer upon the hill.
I am in love with apple trees—
Great-headed gnomes in need of combs—
With willow shot with arrow twigs;
With phantom poplars thinly set
Among the frosted boles of beech;
With Lord and Lady Spruce and Pine
Elegant in robes of green,
And oaks in benediction.
With all the reaching twigs that stretch
Their slender fingers toward the sky;
With long, smooth limbs and giant trunks
That hold the strength of many years.
I find abiding joy with these.
I am in love with winter trees.

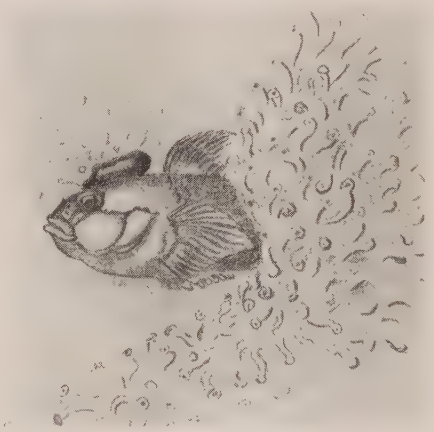
Hunting the Crested Goby

By JOSEPH C. GALLOWAY

It was a cool, quiet February morning in south Florida. The mango trees had nearly finished their bloom, the bees no longer buzzed among them, and great creamy tassels were beginning to push out from the crowns of the palms. On the street we met our friend Percy coming up from a walk to the bay.

"I have just been down to the sea-wall to see how the tide is," he said. "There are a lot of little fish down there among the rocks. You can catch them in your hands. Maybe they are the kind you are looking for. You'd better go down."

We were interested in gobies. In fact, one of the things we hoped to do on this, our first extended trip to Florida, was to become acquainted with these curious little fishes, so like the fresh-water darters of our northern streams in outward appearance and movement, yet differing in many ways. One species we had already found. In a tidal river, where limestone rocks had been banked against the piers of a bridge to prevent the cutting of the stream banks, sea-worms had covered the rocks like hoarfrost with slender upright or creeping tubes of white lime, with many holes and caves among them. Here we found our first gobies, the younger ones pale and speckled like our johnny-darters of the north, and heavy old ones, dark indigo in color, reminding us of the blenny darters in full breeding dress. They slipped into the nearest holes like mice when we attempted to catch them; the sea-worm tubes were like needles and caught and tore our net; but at length we obtained enough for examination, and found they had combs on their heads, somewhat like those of barnyard fowl, and hence are known as the crested goby. This crest is a ridge that stands erect, and is red with a blue edge in the younger ones, and deep blue in the older ones, the same as the body coloration.



MEET MR. GOBY

Viewed from any angle, a goby is still a queer-looking individual. The crested variety carries a comb like a chicken, and both it and the mapo, below, have ventral fins that unite into a sucking disk for clinging to rocks

But these were in the tidal river, and our friend's were in the bay; they promised something new. We picked up a two-quart pail and went down to the sea-wall. Percy was already there, out at the end of the rocky point, fishing for redfish and sheepshead with a long cane pole.

"In there," he said, pointing.

Down on our knees we went. Every rock was covered with oysters, striped white and brown, their edges sticking out like knife blades. In the little channels among the rocks, or hiding in the crevices between the shelf-like shells, were the gobies, a finger-length long, light brown with dark saddles and spots, and with gay fins barred with orange-red, yellow and lavender.

We lifted two or three small oyster-laden rocks to make an open space, and went to work with our hands, trying to corner a goby in a crevice; but each one would slip out by an unseen passage, glide a few inches into another hiding place, or hop up and sit like a lizard near the top of the rock. Again and again we tried, each time with the same result. The gobies would not leave; they merely went round from one crevice to another. We could not tell how many there were. Sometimes we could see six or eight at once in less than two square feet of space. All this was

interesting, but our patience was waning rapidly and we still had no gobies.

Next we turned our two-quart pail on its side on the floor of our hunting ground, and tried to herd the gobies in. In and out of their holes they went, and back and forth across the floor. Now and then one slid into the pail, and in time we had several in our storage jar. Then all at once our luck ceased, but not for lack of gobies.

"Here is a piece of shrimp; put that in your pail," said Percy, tossing it from his bait can. Then things began to happen. Gobies stuck their heads out from everywhere along the oyster walls, and others slid across the floor. A dozen crowded before and into the pail, not minding our hands at all. Where they all came from so quickly we could not tell, but now we had more gobies than we wanted.

Percy, in the meantime, had caught a redfish, two sheepshead and a couple of spadefish, which he called angelfish, and was ready to go home. So were we. Later, in our aquarium, stocked with clumps of oysters, sea-lettuce, and our gobies, we watched them climb and perch upon the rough shells, and saw how the ventral fins, after the fashion of most gobies, are united into a sucking disk, with which they can cling fast to the rocks when the waves are slapping against them. And while we watched, we learned to which of the twenty-five species of the Atlantic Coast our gobies belong. For as they perched on the rocks, or lay quietly on the white sands resting on their motionless pectoral fins, we saw the free upper rays of those fins like threads waving to and fro with the current from the gills. And then we knew our gobies were *Bathygobius soporator,* ranging from North Carolina southward, and said to be one of the most abundant shore fishes of the West Indies, and commonly known as the mapo.

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The Lesson of Mt. Taurus

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SPOILING THE BEAUTY OF THE HUDSON RIVER GORGE

A view of the quarry on the face of historic Mount Taurus opposite West Point. Foresight could have prevented this desecration

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TO THE tune of stuttering drills, quarrymen are busily extending the great scar on the flank of Mount Taurus, historic "Bull Hill" of Revolutionary days, opposite the United States Military Academy at West Point, New York. This destruction of the beauty of a strategic part of the Hudson River gorge has rallied the friends of the river, caught the attention of the Legislature and, in the end, should mean much to the preservation of the beauty of the stream and its immediate banks.

Friends of the Hudson River have banded together into the Hudson River Conservation Society. A distinguished group of directors and members, under the chairmanship of William Church Osborn, have dedicated themselves to "preserve in its natural state the Hudson River and its valley and to preserve the historic landmarks thereof." To this end the society will seek by cooperation with State agencies, by the acceptance of gifts for purchase and by public education to guard against any other such desecration as the Mount Taurus quarry. Headquarters of the Society are at 542 Fifth Avenue, New York City.

The quarrying activities also have had their reverberations in the New York Legislature, where a resolution deploring the quarry was first adopted, to be followed by the creation of a commission to make a survey of the River and its valley and recommend action and land acquisition. Whether purchase of Mt. Taurus will be urged remains to be seen, and will depend largely on financial and legal considerations. Mr. Osborn is a member of the State Commission.

There are many instances in recent American history of delay in preserving some irreplaceable beauty spot or landmark. Often they have spurred people on to protect other similar areas. The Hudson River Conservation Society is now immediately concerned with stopping the present quarrying, which is progressively disfiguring; with saving from a similar fate adjacent Break Neck Mountain and the mountain several miles south known as Anthony's Nose. This constitutes the eastern approach to the Bear Mountain Bridge. Options have been taken on probable quarry sites, and the Society is now campaigning to complete the acquisitions. It is to be hoped that every success may attend these efforts and that these landmarks will be preserved for posterity.

The Leaf

By OTTO DIEMER

Decoration by R. Bruce Horsfall

"WHAT makes the leaves change into bright colors before they die? Well, son, Jack Frost and Old Sol have something to do with it, and I believe that the glorious colors they paint on millions of leaves each year carry a message of hope to him who will see.

"Once I had a leaf for a friend and I came to know it quite well during its little life. Shall I tell you about it?

"One day in early May I was sitting here when a rustling murmur broke in upon my reverie. I looked up and saw the maple leaves fluttering and I followed the breeze as it tumbled the leaves in green waves.

"A robin hopped in the lush grass; then flew into the branches above me. It vanished behind a moving curtain of green, then quickly popped up above a leaf that rose before a sudden gust, revealing a nest in a cup of branches. The curtain fell. I saw the robin no more that day, but I continued to watch the large leaf that protected the nest from the sun and prying eyes.

"What is there about a leaf to invite thought, I wondered. We welcome its birth as a promise of spring; accept its cool sanctuary in summer; admire its color in autumn.

"The large leaf—my leaf, I came to call it—was only one of many. Probably no other human eyes would ever note its unusual beauty among the millions of its own kind. An odd thought came to me as I watched its antics in the playful breeze. I wondered if it would live and die unknown and unloved by anyone or anything. But in the days that passed I found that the wind and the rain and the sun knew it as intimately as did the nesting robins.

"And I learned that from the sun and air it drew in energy from thousands of tiny openings on its under side. All through the spring and summer they would open and close while the life force within the leaf transformed the energy from sun and air into food for the tree. And each leaf, I knew, was a veritable heart, pumping water from the roots deep in the earth's rich well and drawing it up, up into the farthest branch and twig, thus nourishing the entire tree.

"One evening in July when I was here, a light patter of rain fell among the leaves and they seemed to quiver with joy. The cool raindrops kissed the glistening face of my leaf, and its outstretched pointed lobes turned upward under the pelting, as a maid would hold her apron to catch ripe fruit from a tree. Shortly after, a beam from the lowering sun shot through the clouds and splashed daubs of golden light over the leaf, and the raindrops sparkled on its emerald surface. Clouds again blotted out the sun and the leaf leaped in abandon in the storm wind. The robin appeared from nowhere and settled herself over the nest.

"At high noon one cloudless day I saw the leaf in repose. The landscape beyond the trees was soft with haze. The leaf was like a painting on canvas. But even as I watched, it trembled under the soft touch of a fugitive breeze. Then the breeze from the southwest swayed it gently. The green leaf-clouds above the nest murmured a lullaby to the robin fledglings. The breeze died, and with it all sound and movement save the droning flight of a bee and the orderly passage of a ray of sunlight that crept lingeringly over the face of the leaf.

"Weeks passed before I came again and found that the topmost leaves in the big maple were proclaiming autumn. Their sweeping edges were delicately tinted in pale yellow; their lighter green contrasted vividly with the darker green of the lower leaves.

"On that day I could not shake off a vague feeling of melancholy. Dull, gray clouds hung low in the sky. A katydid tuned its shrill song. I looked up at my leaf expecting to see it hanging listless and forlorn, drab as the day. But no, it was still fresh in its verdant dress, buoyant in the light breeze, bobbing gayly among

its fellows with a silken rustle. It seemed to nod toward me in friendship; then redouble its efforts for my benefit.

"The busy colony of robins assembled as if at a signal in the gathering twilight, and I opened a bag and scattered an offering of crumbs to them. A shaft of sunlight shot upward through a rift in the clouds deep in the west; a duet of doves murmured in an elm nearby, and I forgot my melancholy.

"I paused under the tree one evening when the incense of autumn was in the air. The sunset of the seasons had come and the topmost leaves were now wearing mandarin robes of yellow splendor. My leaf courtesied gracefully, dipping its broad lobes in a shaft of sunlight. I could see that Jack Frost had finally discovered its beauty and had breathed gently upon it. Now its cool green was beginning to rival the gold of the late September sun. The warm sun of noon and the cool of the nights were now taking part in the autumnal pageant of the leaf.

"October was in her gayest mood when I saw the tree again. Life, in all growing things, had reached its peak and was now resting and enjoying the parting caress of the warm sun in those fleeting days before winter spread its ermine. The countryside lay in folds of colorful grandeur. The far horizon was lost in a golden mist, and a few cloud wisps swept southward against a sky blue as the egg of a robin. It was good to breathe deeply of the smoky air, and feel its tang. The mellow sun tempered the sting of the north wind but not its force. It seemed as though a mischievous giant in the north was doing his best to blow down the leaves. There was a lull between each vigorous blow as if the giant were filling his lungs, and at every gust, clouds of leaves tossed; fell slowly, wavering to earth.

"As I walked toward the tree I hoped that my leaf was still there. Yes, there it hung, dancing in joyful abandon with every gust from the north. I knew it only by its size, for it was now a thing of indescribable beauty. Bright yellow was freckled with flaming scarlet, deepening into blood reds and golden browns.

"I shall never forget the full glory of the leaf on that late October day. Yet, then, I looked upon it knowing that in a few more days that glory would fade, and with it would go the life of the leaf. When I left, I glanced back at the big maple, now aflame with color, and saw my leaf waving in the breeze as if in farewell.

"The countryside drooped under the frosty robes of capricious November. The warm colors that still remained in the leaves paled into dull browns. Yet a few leaves still clung to the maple, and I could not be sure that my leaf had not fallen until I saw the robin's nest. Now, shrunken and dust-colored, it no longer shielded the deserted nest from view.

"A cloud bank appeared in the north and a biting wind moaned through the branches of the tree. The leaf swung stiffly in its embrace. The wind increased in force and soon the last of the leaves conceded it victory. Then mine, shrivelled now, yielded to the pull of the wind. It tumbled upward for an instant, bobbing from side to side, then fell among other leaves that covered the grave beneath the tree.

"There it lay upon mother's grave and I thought of the beauty of her passing and of the beauty of the leaf before it fell from the tree. And I believe, son, that the glorious colors of the leaves at the time of their death is a hint of the eternal beauty to come—and a sign to man that the end of life can be beautiful. Death paints a message of hope on the leaves in autumn—a cheerful message.

"Mother must have thought so too, son. Death was a friend to her. The autumn of her days had been the end of many years of suffering, suffering that grew more intense toward the end. A great and courageous heart that had borne the burden of painful years received the last measure of misery unconquered.

"Do you remember that day in early November when she looked for a long time through the window at the last of the leaves? She could not speak to us but her smile was never more cheerful, and the unutterable sweetness in her eyes seemed to hold the answer to the mystery of death's portals. Like my maple leaf, she passed in beauty.

"Death is kind to many—kinder, perhaps, than life would have been. I recall the doughboy who lay and waited at the side of a road in the Argonne. I recall

him whenever I see a maple leaf richly colored in russet brown and golden yellow. He waited at the side of the road for death.

"They had carried him to the field dressing station and the hollow-eyed surgeon muttered something about the boy's amazing endurance. They pillowed the upper part of his body on khaki blankets, and then brought him to the side of the road under a fringe of trees near a field where men were working in the tortured earth preparing a place for the residue of battle.

"He was too desperately wounded to be moved and there was fear in his eyes as he saw that he was among those who were not to be taken to the rear. He watched the work of a group of men who moved silently among the men on the stretchers, stopping here and there to raise a still form and carry it, not to a waiting ambulance, but to the open field beyond the fringe of trees.

"His arms moved spasmodically and the fingers of each hand dug into the earth. His eyes continued to rove and in them now there was a gleam of another horror greater than the wounds in his body.

"A maple leaf circled and dipped above him and finally came to rest on the khaki blanket covering his chest, and he looked up and stared fixedly into the branches above. An inexplicable change came over him; his eyes lost their wildness and the clenched hands opened stiffly and rested inertly on the ground. His eyes closed but after a moment they opened and there was a soft light in them as he studied the russet brown and golden yellow colors of the leaf which he held before him. Possibly he saw in the leaf a picture of autumn days back home. His arm fell and he seemed to be crushing the leaf against his chest.

"The doughboy looked beyond the fringe of trees and the open field at the red sun sinking beneath a cloud bank. His wide blue eyes gleamed above the white bandages and seemed to reflect the beauty of the sunset. The restless fingers caressed the leaf on his chest. A cold wind swept through the trees and sent a shower of leaves over him. A rumble of heavy guns came out of the east with the approach of darkness. The luster in the eyes of the doughboy faded; the fingers over the leaf moved no more.

"Well, son, I see a star twinkling in the east, and there's a great golden moon rising to spread its farewell benediction over all the fallen leaves. And do you hear that low humming sound? It's the north wind singing a requiem in the forlorn trees as it carries the dead leaves down to the bosom of Mother Earth. Come, son, night is here, let us be on our way home."

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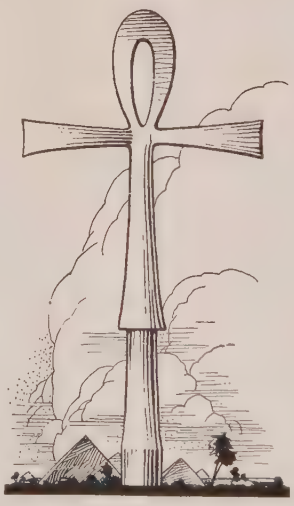
The Tau as a Nature Emblem

A FREQUENT, always enjoyed and stimulating contributor to our pages is Stephen Haweis. Artist and writer, he now makes his home in Dominica, British West Indies, where he finds life simple and less costly. Mr. Haweis is constantly thinking up new ideas and propounding original views on things that most of us, unfortunately, do not stop long enough to think about. In a recent letter he writes:



"It is a pity that there is no possible way of telling birds and mammals when we feel friendly toward them, in such a way that they can believe us. But Man, the Lord of Creation, does not invariably respect the white flag in war, so perhaps we receive as much respect from a sparrow as we deserve. Still, we might set up a peace sign in our gardens—peace and good will towards birds—to supplant the war-sign so often seen waving there.

"I propose the use of the tau, the ancient Egyptian cross that did duty as a Christian symbol in the first two or three centuries. It is still occasionally seen in church decorations, but is entirely obsolete as a living symbol of the Cross. The tau is beautiful in design, easy to make in any material, and, painted sky blue or turquoise, it would not be an eyesore against any garden background, whether tree or flowers. It should, however, be standardized as much as possible. It might help to unite Nature lovers, silently affiliating individuals and families. And—who knows—birds and beasts might come to understand its meaning more quickly than one might expect."

Herewith is the design of the Egyptian tau. And herewith, also, we submit Mr. Haweis' idea to our readers. He has suggested further that little emblems with this design might be made in a variety of items for personal wear, such as watch charms, pendants, pins and the like, thus identifying one Nature lover to another.

This is an interesting idea, but we feel that its actual adoption is one that should spring from a spontaneous desire to express the sentiment that the tau would represent. In other words, we do not feel that it is an idea that should be "promoted", but that if it is worthwhile, as we feel it is, it would gradually gain acceptance. Demand for the production of these emblems in various forms would follow that acceptance.

We would be much interested to hear the thoughts of any of our readers on Mr. Haweis' idea. If it gains favor, we would enjoy aiding its further spread.

Natural Elk Management

By OLAUS J. MURIE

Bureau of Biological Survey

PHOTOGRAPH FROM U. S. BUREAU OF BIOLOGICAL SURVEY

ELK IN THE FOOTHILLS ON NATURAL WINTER RANGE

When the animals can find food under Nature's conditions, strong and healthy herds are the result

THERE comes a time in autumn when all Nature is in suspense. The summer greenery is but a memory, even the golden glory of autumn has faded, the leaves have fluttered to the ground, and the trees stand bare and leafless, waiting. A few flurries of snow and cold days. Time for storm windows and full coal bins, for winter is at hand.

This is an annual occurrence in the picturesque valley familiarly known as Jackson Hole, lying in the Rockies at an elevation of more than 6000 feet. The summer tourist season is over, the eastern "dudes" have departed for their homes, returned to the grind of school or business. Yet for a time there is plenty of human activity, for the elk hunting season is on. Strange cars are in the valley, guides and outfitters vie with one another, pack trains are busy. Now and then a car leaves the valley with an antlered elk head lashed to the bumpers.

But sooner or later come the heavy snows. Hunting camps are broken, outside cars leave the valley, and the silence of winter settles over the snowbound countryside. A few elk have been dribbling southward toward lowland ranges, but now they come in droves. No longer do the mountains ring with their bugling. They drift quietly, feeding as they go. Some remain behind, finding sufficient food on isolated mountain tops and wind-blown ridges. But these spots are limited and the main herd moves on, many of them to the Gros Ventre basin, many others to the foothills or the valley bottom near the town of Jackson. Hard times have not yet come. There is still plenty of food and the early loose snow is no hindrance.

This has been the story since elk first lived in the West, and they have thrived and multiplied through the centuries. But there is a difference today. Where formerly the valley lands were covered with wild hay and immense willow patches, ideal winter provender, they are now marked off in a patch work of square farms under fence. The willows have largely disappeared and much of the forage is put up in fenced stacks for cattle. There is still some food for the elk, good grass on the open foothills as well as on parts of the lowlands. And for many years there has been available for the herds a tract of land set aside as an Elk Refuge, administered by the Bureau of Biological Survey. But the elk smell the fine hay in the forbidden stacks of the ranchers and cannot resist trying to get some of it, leaving the foothills and their own

PHOTOGRAPH FROM U. S. BUREAU OF BIOLOGICAL SURVEY

A VIEW OF AN ELK HERD FEEDING ON THEIR NATURAL WINTER RANGE

The meadow is pitted with their diggings where they have pawed away the snow to reach their food. So they lived before the ranchers came

refuge to invade the domain of the ranchers. And there lies much of our well known elk problem.

The ranchers are harassed, but wildlife authorities do the best they can with a restricted winter range. The result has been that hay was provided directly for the elk, to furnish food and to bait them away from the ranches. For years we have fed the elk—the Federal Government on the Elk Refuge; the State of Wyoming in outlying districts. Hay feeding has passed the emergency stage and has become an annual program. Game authorities have become accustomed to it, and so have the elk. The animals come promptly to the Elk Refuge in early winter, sometimes several thousand strong, and stand around in the fields expectantly, awaiting the dole.

Hay feeding has been necessary under the prevailing circumstances. It could not have been avoided. But a change of thought has come about concerning artificial feeding of game. We have become conscious of the fact that artificial feeding is expensive and after all is not good for the game species. The animals become semi-domesticated, dependent, less virile. Once feeding is begun, the animals lose incentive to seek their own forage. I have heard the elk on the refuge referred to as the "hospital herd", because of the weaklings so prevalent there and their general lack of vigor and spirit. On the other hand, those that remained in the hills, rustling for themselves, were more "thrifty", as the game men speak of them, more alive and alert, certainly finer looking animals. Furthermore, under artificial feeding, our winter losses have often been very heavy, frequently many times as great as among those that winter naturally. This was the result of diseases directly induced by the feeding of hay and the necessary concentration of animals.

The evils of artificial feeding have become known, the results deplored. But what could we do about it?

For some time the Biological Survey has had in mind certain remedies for the situation, but until recently has had no opportunity to try them. Certain ranch lands in the valley appeared to be the key to the situation and in the last few years a program of land acquisition was put into effect. Furthermore, a long drift fence has recently been built to keep the migrating elk from wandering west of Jackson to harass certain ranches there. It was thought that if the elk movements could be somewhat controlled, a more efficient, cheaper, and more desirable management program could be adopted.

The plans are only partly completed. The fence was built and additional acreage was made available for the elk. But already the prospects are promising and the results in the winter of 1936-37 are interesting in this respect.

The heavy snows came as usual. So did the elk. They could not bother the ranchers seriously so they were left alone, to paw through the snow for their own food. The snowfall was fully as heavy as in any normal year, yet the usual hay feeding program was omitted. Day by day the

elk could be seen scattered over the fields of the Elk Refuge, helping themselves by digging through the snow in the manner of their ancestors. And they thrived.

On February 23 I climbed the hills east of Jackson to examine feeding conditions. From a vantage point I could look down on scattered elk, quietly feeding or resting. The field was pitted with their diggings. On the slopes above me were other groups, some resting in an aspen grove, others strung along on a wind-blown area. The snow was criss-crossed with their trails. Here was a perfect picture of elk on winter range, a return to natural conditions. Furthermore, the animals were in good condition, contented and thriving. Whereas in other years the winter losses would have been well under way at this date, the losses during this entire winter were negligible.

To be sure, some time in March it became desirable to do a little feeding because of some local circumstances that developed. But this winter's experience gave promise of better methods in the future, when hay may be left standing in the fields for the elk to harvest by their own efforts and with only enough hay put up in stacks or bales to take care of real emergencies.

The crying need of wildlife today is a place to live. To try to concentrate animals on a domestic stock basis, on limited areas, with all the artificialities of stock raising, simply means to produce a "soft" animal, less able to care for itself, and to destroy the very qualities of strength, agility, and alertness that we so admire in a game species or in any wild animal. Welfare of wild creatures depends on mankind's generosity in letting them have some portion of the earth's surface, equipped with at least some share of their ancestral environment, in which to live their accustomed life. This is true kindness to our wild animals.

It is heartening to know that some progress in that direction has become possible with our famous Jackson Hole elk herd.

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Albino Wake-robins

By RAYMOND S. DECK

It is a wild, beautiful place—that tiny finger of forest where the white wake-robins grow. True enough, there's a trim bridle-path just beside it, well-hammered by horsemen from the Big City; and a mighty boulevard a few rods away roars all day and night with New York traffic. Still, there are other sights and sounds there: a pair of oven-birds that nest every year . . . ferns . . . tree-frogs . . . the golden chimes of veeries. . . .

The wake-robins spring up every April just as the ancient beech trees about are shaking out their leaves. I don't know how they have managed to survive in a place like that unless it is because the woodland is so small that flower-pickers overlook it. The plants are there in dozens, and no every-day wake-robins are they either, but doughty individualists, as wild things should be that have the fortitude to dwell in the fringe of the Big City. Some of them, of course, are just like *your* wake-robins, with red-black blossoms nodding sedately over trios of lush leaves. But there are others the like of which you would never see in years of tramping through springtime woods.

Some are silvery white, as clean as snow. Some are tawny yellow. Others are buff, with streaks and splotches of ancestral purple. And last spring there was one wake-robin there more elegant than any wildflower I would ask to see: a huge crisp blossom with white petals veined and washed with bluish pink. The ring of anthers, bursting with their load of pollen, was bright blue. The flower didn't look at all like the big white trillium, which grows pink and more beautiful as it fades away. It didn't look like any other sort of trillium either. It was just one of Nature's one-time-only experiments—an albino wake-robin.

Maybe I should have dug up that beautiful plant and borne it off to bloom year after year in my garden; or should at least have gathered its seeds and sowed them in an urban plot along with snapdragons and delphiniums. Its kind would be a prize in anyone's yard. But somehow albino wake-robins would seem out of place in a yard. They belong where mine still are today, in a nostalgic finger of beech forest where it is damp and cool, where veeries sing, where flying squirrels play at night, and where all wild things are at home.

ONE OF NATURE'S RARER TREATS

Trilliums they are, but not the usual red-black blooms of our garden. These, discovered in a tiny woods near a much travelled highway, are white, buff or tawny yellow

CHEBUBA—

The flying squirrel that motored across the continent

By BETTY HONE

WE HAD no idea that flying squirrels were so little. Chebuba was a mere handful. Sometimes he was another kind of a handful, but even the victims of his mischief agreed that a flying squirrel makes the nicest pet of all.

Like many pets, he was always getting lost. The first time was in a New York City suburb, and the result was that Sallie, a third grader, brought him to me one morning in a hat box. She thought a baby gray squirrel had fallen down their chimney. Her mother and father did not fancy such rat-like pets, so the child's next recourse was the school science room, where they accepted all sorts of queer things. We, for our part, were only too pleased to have the chance to keep him.

One of the big protruding eyes that marked him as nocturnal was battered shut. His soft gray fur was grimy with soot from his home chimney. He was so bruised and frightened that it seemed best to take him home where he could sleep all day in the quiet dark of our clothes closet. Our landlady was most amiable about the new roomer—if we kept the door shut.

The first thing Chebuba had was warm milk, which was offered from a teaspoon. Nuts, of course, tickled his palate, but he liked rolled oats, lettuce and fruit; in fact almost anything we offered. About the only food he ever refused was an onion and from this he fled. Nest material was a problem, but dry grass proved to be the answer.

By the time Chebuba's bruised eye was healed we had become good friends. Before long he would scamper all over our room, hop up on the bed, and then, in a sudden panic, dive beneath the covers. If I was reading in bed, his

BETTY AND CHEBUBA

The frolicsome squirrel was perfectly at home with the author, scampering along her arm or over her dress as fancy directed

favorite refuge was the back of my neck. Generally he was not lively until after dark. If we came home early he would be found asleep in the smallest pocket he could find among our wardrobe. One night he was not visible in any of the more favorite pockets. My heart sank. Could I have left my door open and given the house dog or cat a chance at him? Not until nearly every article was moved out of the closet did he pop out from under something.

It was about the middle of June when Sallie brought Chebuba to us. As soon as school closed we were to go to Washington to meet some relatives with whom we were motoring West. Our Washington friends, with long experience in travelling and in keeping pets, soon agreed that he could stand the trip of some 6000 miles across the continent and back.

There was barely room for his cage atop our load of baggage, but that was one of the indispensable items. Our first camp was a Maryland farmhouse advertising for "tourists". Chebuba was to spend the night in our room. In the middle of the night something crashed. Our flashlight showed the curtain rod fallen, with our pet teetering on the supports and trying to look innocent. He was enchanted with curtains and in another tourist cabin farther along, he raced up and down them while we had supper.

He first noticed hats in Illinois. Here our hostess apologized for her father's hunting clothes hung in our room. Of course we did not mind and surely Chebuba did not. Though we heard him scampering about the room that

A SEASONED TOURIST

Chebuba, like his human companions, was in favor of frequent roadside stops at refreshment stands, particularly if nuts were on the menu

night, morning found him nicely curled inside father's hunting cap. In the car, he liked no place so much as the cloth bag containing "Auntie's" best bonnet. If routed there by some disturbance, the puckered mouth of the bag made a quaint frame for his wise little face. When we were home again, he astonished Mother by making a nest in her best blue felt, furring it from a rabbit fur hanging in the same closet.

We had thought "Chebuba" an Indian name for flying squirrel, but an authority on Indian vocabulary says it is merely a phonetic rendering of his song. He had a distinctly angry chatter when disturbed, but we heard nothing song-like from him until we reached Colorado. We had turned him loose in our cabin for the night when we heard a loud trill. It was one of those ventriloquial sounds that seem to come from nowhere. We looked for our pet and found him perched on the bedstead with his mouth working. Similar sounds seemed to be coming from outside. We wondered if the whole performance had not been started by another flying squirrel on our cabin roof. Only rarely did he sing for us.

When we really camped out, we let Chebuba have the run of the car for his nightly exercise. Often it was so hot that we hesitated to close the car windows. Twice this compassion came near losing our pet for us. The first time was in Arizona, when we spread our sleeping bags in a dry wash fully fifty feet from the car. In the middle of the night he came burrowing into our blankets. The same thing happened in southern Utah where we had pitched our tent among the junipers. We always marveled why he came to us instead of escaping to the trees. Could he have regarded us as his true friends?

Sometimes his habit of nocturnal activity was not so charming. Missouri in July is too hot even for sleep. But whenever we became the least bit drowsy in our hot "tourist room" Chebuba would come bouncing across the bed or try to wriggle inside. Once in he invariably burrowed down until he precipitated an eruption from the one with ticklish toes. He seemed to enjoy the racket he set up by running back and forth over window screens. In scientific honesty it must be admitted that he was not so active throughout the night. There seemed to be two roughly defined periods; from 9 p.m. to midnight and from about 2 to 4 a.m.

Why he didn't die of heat on the trip has been perennially a wonder. The breeze coming in the car windows in Kansas seemed to sear our eyes. A filling station thermometer showed 106 in the shade at 4:30 one afternoon. That was the day we began to give him shower baths. He loathed them, but it was a question of his survival. It had become part of our routine to give him water to drink whenever we stopped at a filling station. It is amusing to think of the trail of service men who may still be talking about the squirrel they saw drink from a wine glass.

Chebuba had never liked to ride in his own cage, and after several dousings through the wire netting, he was convinced of its undesirability. A berry basket lined with soft cloth pleased him very well, but his chosen seat was the dashboard pocket. The berries from the aforementioned basket pleased our pet. He loved small white seedless grapes also, but canteloupe above all. One morning at breakfast in New Mexico, a mischievous friend clapped a half-eaten shell right over our pet. As quickly as possible he emerged, a most bedraggled flying squirrel interested only in tidying himself.

I do not know of a tidier animal. The vigor with which he washed his face did credit to his early training! The least spot on his fur troubled him exceedingly. A small box of sand we found helped greatly in removal of greasy spots. A tin of insect powder was on hand in case Chebuba did too much scratching. However, in all our handling of him we never saw a sign of insect pests.

To his tail Chebuba gave the greatest care. In truth it was a most useful adjunct. Daytimes it served as a curtain over his face. At night, of course it ruddered his flights. Flying squirrel tails do this most effectively; they are surprisingly thin and flat compared to other squirrel tails. During our auto trip there was never much chance for Chebuba to "fly" except from one person to another. Naturally he favored tall people. Once back home he had our entire attic in which to romp. One night I found him slithering along the electric wires overhead with the nonchalance of a tight-rope walker. On a floor he seemed to move more by tail jerks than by any motion of his feet.

The first time he saw a mirror he jumped at it and bumped his nose so hard that he let mirrors alone thereafter. He liked riding around the house on one's shoulder or on the top of one's head. These also made good vantage points from which to glide. Once we put him on a cousin's

mop of thick curly hair. It was amusing to watch him trying to get his legs free enough to jump off. But the danger of carrying Chebuba around "on top" was that he liked to scoot down inside one's clothes. After a while his claws grew so long that they could scratch quite painfully, especially if one had been sunbathing by the Pacific!

Although we did not devise a way of keeping Chebuba's claws short, we tried to control the growth of his teeth by keeping him well supplied with unshelled nuts. We enjoyed watching him wrestle with a whole walnut nearly as big as himself. He liked chocolate; especially chocolate-covered nuts, and one hot day he joined us at our ice-cream.

Compared to our native Adirondack species, Chebuba seemed about half grown. However, he belonged to the smaller, more southern species, *Glaucomys volans*. He had the same soft gray coloring of the larger one. When curled up asleep the white edge of his "wing" was so conspicuous that we wondered if, in the dark cavity of a hollow tree nest, it might serve as a directive marking.

His scientific classification with rodents nearly lost him to us at the California state line inspection station. Rodents, it seemed, were not admitted. But we argued that we were going out of the state with our pet in three days. It was after eleven on a very hot night and there seemed little hope of compromise. Things looked desperate for our beloved Chebuba who had come so far and withstood so many vicissitudes with us. By a miracle we secured the necessary permit. It had to be signed by the inspector at our port of exit when we had proved we were still in possession of the undesirable alien in question. It can be imagined that we passed that customs station with a sigh of relief that Chebuba had not escaped in California.

But it was in Indiana, within two days of home, that we really believed him lost. The landscape was beginning to look more familiar. We even found an oak grove for a shady camp. Next morning the most thorough search through the car failed to reveal our pet. We tried to console ourselves by thinking that he would fare better in such country than in the deserts we had come through. All day we felt gloomy and kept reproaching ourselves for any involuntary carelessness. Along about twilight the driver felt something on her knee. It was Chebuba. He had discovered a place in the car wall where for once he could sleep all day unmolested.

No journey ever had a more charming mascot. If he learned anything from us, we learned twice as much by watching his ways. And if there was a debt of gratitude between us for many moments of joy he would have been able to collect heavily from eight fellow travellers.

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GROW YOUR BIRD HOMES

By CORA GILLINGHAM SHEAFOR

VARIOUS types of gourds make interesting and pretty blooming annual climbers that rapidly cover fences, trellises and other unsightly objects one may wish to obscure from view, and the ornamental fruits they bear are attractive.

The gourd that I plant for growing bird homes is called the dipper gourd. The fruit is 15 to 18 inches long, with a "dipper bowl" six to eight inches in diameter.

When ripe the gourds should be gathered and set in some dry shelter where they become dry and water-proof. When grown on the ground the stems of the dipper will be curved, while if raised as a climbing vine the weight of the blossom end will cause the stem to grow straight. Gourd seed may be procured from any seed house and is inexpensive. Because the seeds are hard it is best to soak them overnight before planting. The plants require no special care, and will grow on any well-drained soil if kept free from weeds and cultivated a little once a week, the result being many unique, useful, and inexpensive bird homes with a small amount of work.

When the gourds become dry, carefully cut an opening with a knife or small coping saw, then clean out the pulp

and seeds. Now you have a bird home, practical and light in weight, that you can easily hang out on the ends of the branches where cats seldom venture. Birds like privacy, so turn the door away from the much used garden path and hang it on the most sheltered side of the tree.

The earliest bluebird is sure to choose a gourd in preference to the other painted homes, but not only bluebirds will be attracted by them. The martins, wrens, chickadees, nuthatches, and even the downy woodpecker may be your back yard tenants during the nesting season.

FATHER GOLDFINCH PROUDLY GUARDS HIS OVERFLOWING NEST

The camera only momentarily disturbed him in his paternal duties of feeding his young

Feathered Quintuplets

By ELIZABETH WALKER INGLES

Photographs by Lloyd G. Ingles

Five mouths opened wide, and five baby-bird voices petulantly cried as the late summer sun filtered through the maple leaves to a nest built of soft grasses and thistle down. A soft *Tic-o-ree—o-ree—o-ree* was heard as Mr. Goldfinch alighted on a branch close to the nest and then quickly flew to the nest edge, feeding each of his little quintuplets with regurgitated food. It was an interesting episode in the family life of the eastern goldfinch, *Spinus tristis tristis,* one of the most common feathered inhabitants of the open fields and road-sides. The bird receives its specific name, *tristis,* from the plaintive, lisping *piuuu* cry.

The male goldfinch, in his bright summer dress of deep yellow accented by black on wings, tail and head, often is known as "wild canary" in the places where he is commonly seen. "Thistle bird" is another name applied to this species from its habit of feeding on thistles. These birds are gregarious at all times of the year except in the breeding season. Flocks of sixty or seventy birds often alight on a thistle patch, wrench off the seeds, extract the meats and drop the shells, their actions greatly resembling those of a canary at a seed cup. In addition to thistle seed, goldfinches feed on the seeds of the birch and button-bush in winter. Weed seeds are eaten to a large extent during the summer months, but variety is added to the diet in the form of such noxious insects as cankerworms, plant

A GOLDFINCH HOME

The nest of the eastern goldfinch is wider than it is deep, is fashioned of leaves, grasses and mosses and is lined with thistle down. The eggs are bluish and unmarked

MOTHER GOLDFINCH HAS JUST RUNG THE DINNERBELL

When the parent bird alights on a nearby limb after returning from a successful food hunting expedition, a clamor arises from the nest that does not subside until each infant gets its share

lice, small grasshoppers and beetles, and other insects.

The dress of both the female and immature eastern goldfinch is a drab olive. Only the male wears the vivid black color on his dress. In the fall, the adult male birds share with the females a post-nuptial change of plumage, and assume an olive dress not unlike that of their ladies and young.

A great deal is known about the private life of the goldfinch, for his habit of going about his business in the midst of human activity, paying little heed to inquisitive humans, has increased our knowledge of this bird. During the warm days of the summer all heaven and earth seem to be in tune with the sweet *per-chic'-o-ree, per-chic'-o-ree* calls of the goldfinch. The joy of living and the wild abandon of these birds at the season when other birds are nesting are of special interest to all Nature lovers. As the bird swings through the air with its characteristic undulating flight, its song is as sweet as that of any caged canary. Dr. Chapman says that "their love song is delivered with an ecstasy and abandon which carry them off their feet, and they circle over the fields sowing the air with music".

Nesting late in the summer, the goldfinch is more successful than many other birds as he does not run the risk of having his nest parasitized by the cowbird. In northern Michigan last summer, many nests of other birds were observed to contain one or more cowbird eggs. Usually parasitism of a nest by cowbirds results in the destruction of the young of the original builder, as the eggs of the cowbirds hatch sooner than those of their hosts and the young cowbirds are able to get most of the food, thus starving their foster brothers, or sometimes actually ousting them from the nest. The cowbird, however, mates before the goldfinch is ready to separate into pairs, and thus the goldfinch is spared the humiliation of raising foster children.

Last summer, while in attendance at the University of Michigan Biological Station in northern Michigan, I studied one goldfinch family. The female built the nest in the same tree from which the male proclaimed in song to the world that this tree was his alone, and trespassers would not be tolerated. The artistic nest, wider than high, was placed about twenty feet from the ground on a branch of a young maple. It was fashioned of mosses, grasses, leaves, strips of bark and lined with a mattress of thistle down. When the nest was completed, five unmarked, bluish eggs were laid, and incubation began. During the period of incubation the male fed his mate and when the five little birds came from the eggs, he shared in the job of feeding. All food was swallowed by the parents and given to the young in a partially digested state through the entire period that the young were in the nest. The parents showed no partiality in feeding as each of the babies was fed every time that food was brought to the nest. Soon the young were able to join their elders, feeding on thistle seed at Nature's roadside table.

The eastern goldfinch, a close relative of the willow goldfinch of the west, ranges throughout North America east of the Rocky Mountains from southern Canada south to Oklahoma, Kentucky and Georgia. Minnesota, which is located in the heart of its range, has appropriately selected this colorful species as the State bird. We hail thee—*tristis!* Long may your kind abound to cheer our days with color and song.

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Quiet Pastures

By BELLE HODGES FLETCHER

Hushed is the sweet cadenza of the lark;
Beneath the moss-grown rock the beetles creep;
The cricket tunes his fiddle in the dark,
The praying-mantis folds his wings in sleep.
Behind the drowsy herd night shuts the bars,
Leaving the meadows of the sky to browsing stars.

★ Conservation ★

A part of Nature Magazine each month is devoted to the expression of practical opinions on the vital issues affecting our use and abuse of natural resources, including wildlife, and dedicated to the purpose of assisting Americans to play a militant part in the attainment of constructive conservation aims.

★

WHO ARE THE STOCKHOLDERS?

Following a hearing in Albany with relation to the 1937 seasons on grouse and muskrats, Lithgow Osborne, New York State Conservation Commissioner said:

"The response to my invitation that the state's hunters and trappers advise me on control practice involving these two species is unusually gratifying. It shows how quickly the department is able to feel the pulse of the sportsmen in situations such as this and act accordingly. And it appears to me to be another example of the growing cooperation between the stockholders of New York's tremendous wildlife business and the directors."

Because it embodies a direct statement of philosophy with respect to our wildlife and its administration, Mr. Osborne's assertion invites comment. As we understand it, the stockholders of a corporation own that corporation and its assets of whatever sort. The directors are, we believe, elected by the stockholders to represent them in more intimate contact with the conduct of the business. So we find that Mr. Osborne, in effect, said that the hunters and trappers of the State of New York *own* the wildlife of that State, and that there is a growing cooperation between them and the directors to get all that is coming to them out of the business.

This is no new idea. In fact, although it has no rightful justification, there is logic to support it. The logic is based upon original error, and that error is the administration of wildlife resources with funds derived from licenses to permit destruction of these resources. It is only natural that the hunter, trapper and fisherman should feel a proprietorship when he reads that, in 1935, for example, nearly a million dollars were paid to the State of New York for 473,912 hunting, trapping and fishing licenses. And when he reads of the wonders to be done in increasing wildlife through funds from duck stamp revenue and by segregation of the tax he pays on his guns and ammunition, he further feels that it is *his* wildlife.

There are, however, some 12,600,000 people in the State of New York. Taking the licenses in relation to this number we discover that only 3.76 per cent of the population is interested in the destruction of wildlife. So, according to Mr. Osborne, 3.76 per cent of the people of New York are stockholders in the wildlife business of the State and therefore the owners of that wildlife.

There is no doubt that the "wildlife business" is a big one. Interested in it are the transportation companies and the automobile and oil industries that furnish the means to get people into the outdoors and to distant places where wildlife is a vital part of what they go to see and do. Interested also are the resort owners, the outdoor clothing manufacturers, the makers of cameras and binoculars, and myriad other businesses. Interested, finally, are the great numbers of people who care, in varying degrees, for wildlife for the wildlife itself—for its beauty, its example and its essential part in life. Unorganized, paying no licenses, their pulse cannot as easily be felt as that of the sportsmen. Yet, Mr. Osborne, all these—whether individual or industry—are the stockholders in the wildlife business. And, furthermore, so are Bill and Mike, Blanche and Mary, who don't know a marten from a marmot, because, Mr. Osborne, don't forget that wildlife belongs to the State and that the people are the State—at least in this country.

We have no desire to pick on Lithgow Osborne, but he gave us a text—one which, we suspect and hope, was more a pat sentence than a statement of conviction. The viewpoint expressed in this utterance, however, is all too widely held. It is hindering progress toward real wild-

life conservation and restoration in many states.

Even though he may be short-sighted in wanting to have his cake and eat it too, it is understandable that the sportsman should seek to exert pressure on the agency set up to administer animal life and to which he pays his license fee. That this pressure too often has its effect disastrously for the wildlife is due to the fact that in most states the game commission is a political body. It exists by virtue of the direct revenue from the sportsmen. It mails out reams of publicity releases to encourage the sale of licenses as a means to increasing its income. It is responsible to those in political power, and rarely can it act on the basis of scientific knowledge of wildlife conditions, even if it has that knowledge.

The answer seems obvious—non-political fish and game commissions, staffed with men competent in knowledge of wildlife and its requirements, supported by appropriations from the general fund of the state into which hunting and fishing licenses would be paid just as any other tax. Then, and only then, would we have proper recognition of the fact that *all* of the people are the stockholders in the "tremendous wildlife business".

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SUPPORT NEW POLLUTION BILL

Now is the time to rally support, educate your Congressman and organize a drive in support of H. R. 2711, the new pollution bill now pending in Congress. This measure incorporates the important parts of the Lonergan Bill, and has the approval and support of the Izaak Walton League, which has led the fight against stream pollution for fifteen years.

For the record let us briefly review what happened at the last session of Congress. The House passed a measure known as the Vinson Bill, a toothless piece of legislation. This then went to the Senate. Pending in that body were bills authored by Senators Barkley and Lonergan, and, through agreement between these Senators, the House Bill was amended to put teeth in it. This then went to conference where agreement with the House conferees failed before the conclusion of the session. The drive therefore now centers on bringing the amended bill from conference and passing it.

Under the bill, as amended and passed by the Senate, a Division of Water Pollution Control would be created in the United States Public Health Service. Its director would be a commissioned engineer officer of the Service. Further, and most important, this new agency would have the authority to *enforce* the provisions of the anti-pollution law. The bill declares that the discharge of waste into navigable waters is a public nuisance, and provides for court action against polluters.

This measure, and any measure with teeth in it, will be actively opposed by industrial interests that now use our streams to carry their wastes. They prefer to be left alone so that they may continue to endanger public health and ruin the value of our streams as the nurseries for innumerable plants and animals that support a tremendous wealth of aquatic life, and provide safe places for recreation. For years these offenders have urged continued study but no action. However, what we already know proves that the public interest demands the strictest control of the disposition of manufacturing wastes in our rivers. Industry can and must recognize this fact.

From now on until a strong anti-pollution measure becomes law, every conservationist should join with the Izaak Walton League in demanding the passage of H. R. 2711 as amended by the United States Senate. Write to your Congressman and tell him where you stand.

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FOOD OF THE COYOTE

Food Habits of the Coyote in Jackson Hole, Wyoming, written by Olaus J. Murie, well-known to readers of NATURE MAGAZINE, is issued by the United States Department of Agriculture as Circular No. 362. "Contents indicated by title," as the catalogs say, but this circular merits fuller explanation.

This brochure is a by-product of a study of the elk on which Mr. Murie has been engaged at various periods since 1927. Investigations of coyote food habits, based on examination of stomach contents and fecal matter, were carried on during four years. The result (Table 1) indicates 2415 food items, 176 of which represented carrion (remains found dead). Of these, 1556 items, or 64.43 percent of the total, were of mammals; 73 or 3.02 percent were of birds; 579 or 23.97 percent were invertebrates; and 31 or 1.29 percent were vegetable.

In Table 2, the food items, exclusive of carrion, are shown under heads; classed as beneficial habits are the consumption of 1145 items of mammals; as neutral, 297 items, mainly mammals; and as harmful, 187 items, mainly mammals.

Discussion of the status of the various items of coyote food revealed by the study, and conclusions, occupy pages 6 to 24. The coyote of the Jackson Hole region is credited with consuming food items that indicate 70.29 percent economically beneficial feeding habits; 18.22 percent may be classed as neutral, and only 11.49 percent may be charged against the animal. Of the harmful species taken, meadow mice were first in point of numbers, and pocket gophers were second, these two groups thus constituting the principal items of the coyote's food in this section.

One must conclude from this showing that in Jackson Hole, and presumably in other sections where conditions are similar, the coyote deserves encouragement rather than persecution. Agricultural Circular No. 362 may be obtained from the Superintendent of Documents, Washington, D. C., for five cents in cash.—E. A. P.

Things to Think About

The sooner conservation education, and acquaintance with our wildlife for the wildlife itself begins, the better. Such education is of vital importance for the future, and it is encouraging to note increasing evidence of recognition of this fact by school authorities. Our bulletin *"Teaching Conservation"* sets forth the importance of this movement and makes many generally helpful suggestions. It is available for a three-cent stamp to members and for twenty-five cents to non-members of the American Nature Association.

One of the greatest difficulties in the way of carrying on effective conservation education in the schools and with youth groups lies in the comparative dearth of material with which to work. One of the best sources of separate material designed for school use is the National Association of Audubon Societies, 1775 Broadway, New York City. A splendid group of bird leaflets has been prepared by Roger T. Peterson. The conservation idea has been entertainingly worked into the text, which is supplemented with marginal drawings, a picture in color and an outline picture for coloring. These leaflets are distributed through Junior Audubon Clubs and otherwise. The Audubon Association will be glad to send a descriptive folder.

Other excellent study leaflets for conservation teaching are issued at small cost by the Emergency Conservation Committee, 734 Lexington Avenue, New York City. Prepared by a teacher-conservationist, they combine a fine viewpoint with an excellent background of school practice.

Another interesting document to come to hand in this field is an excellent brief in pamphlet form by Jerry E. Stillwell of Dallas, Texas. In it he outlines the need and possibilities of conservation and Nature study work and urges adoption of a definite program in the schools of Dallas County. Mr. Stillwell provides an excellent suggestive bibliography as a basis for the program.

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Including some of the most rugged country in Oregon, and extending some forty-four miles along the backbone of the Oregon Cascade Mountains, the Three Sisters Primitive Area has been set aside in the Willamette National Forest and the Deschutes National Forest. The total area is 191,108 acres, and it is eminently worthy of the designation given it.

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According to a news release of the Michigan Conservation Department, Harry R. Gaines of Grand Rapids has issued a call "for Michigan sportsmen to organize for the protection of their interests". Mr. Gaines is described as a "widely-known conservation worker", which, for all we know, he may be. However, we believe that this release illustrates the often empty and misleading use of the word "conservationist". Organizing sportsmen to protect their own interests may mean organization to oppose restrictions, taxes, increased fees and anything else that may hamper their shooting activities. Does this come under the head of conservation, as it should be defined?

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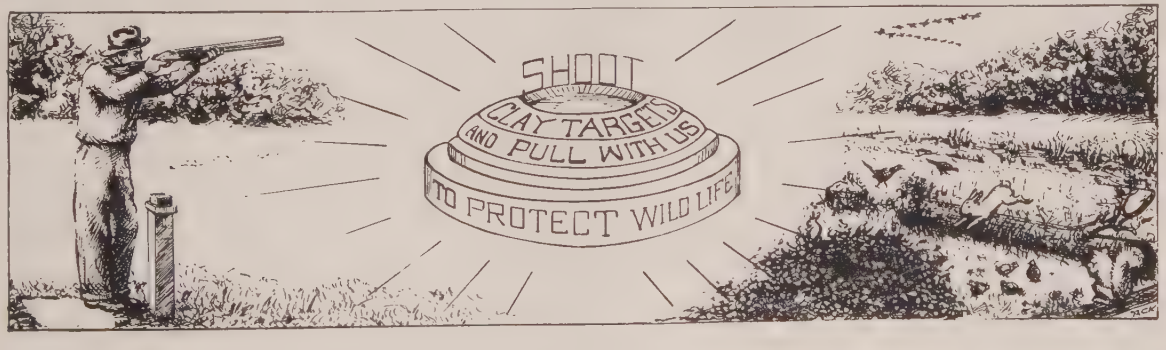

We print above the drawing that appears on the letterhead of the Nebraska State Sportsmen's Association. We print it for obvious reasons since it shows a splendid and all too rare recognition on the part of a sportsman organization of essential restraint in shooting wildlife.

There are, of course, many in the ranks of the sportsmen who see the need of giving our waning supply of game birds, migratory waterfowl and mammals a breathing spell. Unfortunately, however, they do not seem to be sufficiently numerous to direct the policies of their organizations. It is therefore refreshing to see that Nebraska sportsmen have the courage to lead the way.

Organized in 1876, the Nebraska State Sportsmen's Association ranks among the oldest in the country. Its secretary is George L. Carter of Lincoln. With respect to this letterhead Mr. Carter writes that he plans a change in the drawing to place the emphasis still further on conservation. He would have it read: "Pull with us to protect wildlife; shoot clay targets". More power to Mr. Carter, his organization, and its progressive viewpoint.

North Carolina Cleans House

PHOTOGRAPHS FROM THE NATIONAL ROADSIDE COUNCIL

THE RESULT OF WISE ROADSIDE IMPROVEMENT

Showing a North Carolina road intersection where grading and planting of the roadside, together with an easement of property rights, have made possible elimination of signs

For three years the North Carolina Highway Commission has been carrying on roadside improvement work with the aid of Federal funds. Since 1934, twenty projects covering 112 miles of highway have been completed, and thirty more miles will be done this year. While this is not yet a large program, it is sound and an example of what should be generally done.

Safety and the checking of soil erosion are the main objectives. Slopes are flattened, deep ditches eliminated and ground cover is planted to hold the soil. Where woodland borders the highway, attention is given to the conservation and clean-up of the edges of these wooded areas. Ornamental planting will follow once soil stabilization is completed.

One of the most important and significant phases of this work, however, concerns the elimination of advertising signs close to the right-of-way. To accomplish this the Highway Commission obtains easements from the property owners. This usually covers the land extending twenty or thirty feet from the highway right-of-way. While this easement gives the highway authorities control only for roadside improvement purposes, the Commission rightly regards elimination of unsightly signs as a vital part of improvement. Thus far the policy of obtaining easements has been invoked only in connection with the roadside projects, but it is susceptible of use along any highway. Growing recognition of the fact that distracting highway signs are a menace to safety may result in general adoption of the plan on a large scale.

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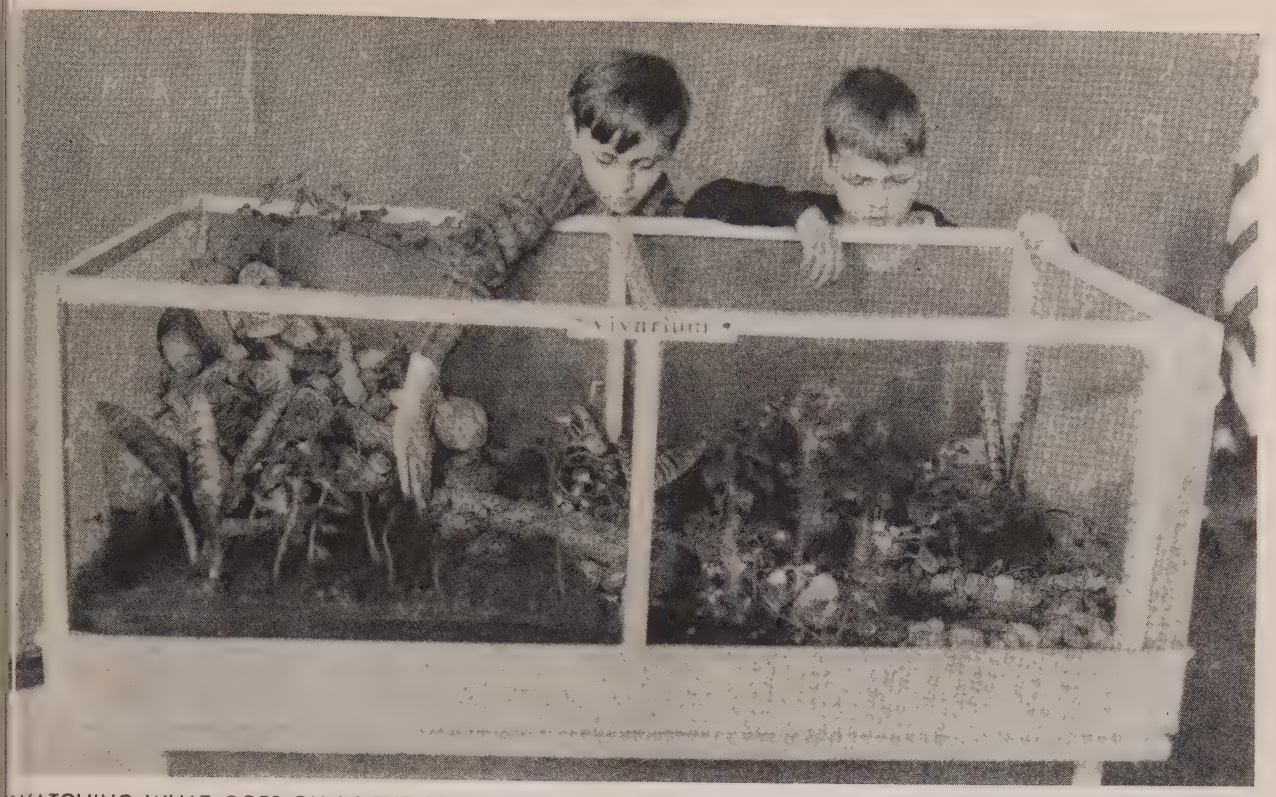
Eight beavers and four white-tailed deer have been sent to Finland as a gift from the New York State Conservation Department. It is planned to use them as seed stock for raising both species in Finland, which will reciprocate by sending a shipment of black grouse and capercailzie, both Finnish game birds, to New York. These, Lithgow Osborne, State Conservation Commissioner says, will be kept on the State's experimental game farm in an endeavor to raise sufficient numbers to permit experimental liberation later. A truck load of quaking aspens will go with the beaver as food for the voyage.

Virginia Wildlife made its bow in mid-September with its first issue as the monthly publication of the Virginia Wildlife Federation. A printed, eight-page publication in newspaper style, it is edited by C. F. DeLaBarre of Blacksburg, Virginia. Mr. DeLaBarre is also president of the state Federation. One feature of the first issue is a school unit on the protection and conservation of wildlife, designed for the middle and upper grades and prepared by Ercelle Bennett and William S. Long. There is an interesting discussion of the problem of the stray cat as a factor in the destruction of song and game birds.



WATCHING WHAT GOES ON IN THE SCHOOLROOM VIVARIUM

This indoor wild life home is fifty inches long, twenty-nine inches wide and twenty inches deep. It sits snugly in a waterproof zinc tray about four inches deep. Only one side is glass although all four sides may well be. The cost is small and often it can be made by the school wood-working class. Ten dollars should cover the cost if it is carpenter built. A good vivarium will last a number of years and is worth the investment

The Vivarium Goes to School

By LOUISE LAIRD

NEED we say that a vivarium is an indoor home for animals made to approximate their outdoor homes? More than that, it is a worth-while schoolroom feature. The children in the third grade brought small animals such as toads, frogs, salamanders, and snakes to school. Some were for Nature study and others as a pet display. Although these visitors were welcomed by the teacher, some way had to be found to keep them at school for observation. The children decided that the animals would be happiest in a place like their outdoor homes. They described these, pointing out that most of these animals liked damp, shady places near water. They said that these little animals liked to have a place where they could hide from larger animals, and that they needed to have certain kinds of food. This led to a discussion of ways in which they could supply these needs in the schoolroom. They decided to build such a home.

The manual training teacher was asked to make a frame to set in the sandtable. This frame he covered with wire on three sides and with a wire top that can be removed to allow the children to work from above. The top also has a small hinged door at one end for placing animals, food, or water in the vivarium. The front of the frame is of glass so that the life within may be watched from where the children are sitting. This whole structure was placed on a strong table with rollers to allow moving about the room, or from one room to another.

The children placed small rocks and sand in the bottom for drainage. Holes in the zinc tray allow the water to run out slowly if the soil becomes too wet. They placed soil over the rocks and sand. Larger rocks were used to form a cave retreat for the animals, and as a waterfall. A tin can with a metal tube was placed among the rocks above the cave. From this water runs slowly through the tube among the rocks, over the roof of the cave, and along a little stream bed made of cement and gravel to a small pool at the opposite corner of the vivarium. This pool was made by cementing a pan among some small soil-banked rocks. Another tube takes off the water from the pan at a certain level.

Many earthworms were placed in the vivarium to keep the soil loose. These also serve as food for many of the residents. Plants were obtained from the greenhouse, the woods or roadside, and the children's homes. Since the vivarium animals bury themselves or hunt food, the plants need to be of a hardy variety such as the strawberry plant, dandelion, peppermint, foliage plants, catnip, and wild ferns. Tiny elms, maples, cottonwoods, locusts or oaks may be transplanted to the vivarium. These grow nicely for a year or two. The children planted acorns, maple

seeds and grapefruit seeds. They were rewarded by seeing these come up as little trees. The grapefruit trees grow well and always stay green and attractive. The children sow grass seed, but it soon dies down and must be resown.

After the home was made ready it quickly became inhabited by six toads, two frogs, two garter snakes, one salamander and four small turtles. Fish and tadpoles were introduced, but the young vivarium enthusiasts found that these were eaten by the snakes so they now are safe in the aquarium. When the tadpoles become frogs they graduate to the vivarium, the small ones gradually disappearing as meals for the snakes.

The most fun comes from observing the animals day after day. The children learn that the snakes crawl into their holes head first, and that the toads and frogs back into their holes, covering themselves up as they go until there are no traces left of their hiding places. They see how the snake sheds its skin and how it moves without feet. They notice how sleepy the animals are during the winter months, and are thrilled to see them make their appearance again after hibernating for some time. Then we hear: "The snake is out!", or "There's a turtle in the pond." These observations are made during the day after the children have finished their assigned work and have some free moments, or when they first enter the room in the morning or at noon.

The plants and animals need continual care. The soil should be sprinkled each day to keep the plants fresh. Water should be kept in the pool. The toads and frogs need damp earth to keep their skins moist. The children are taught to handle the plants and animals with care. The toads, frogs and snakes enjoy having their backs and chins stroked gently. The snakes become less afraid when handled often. As warm weather arrives the children place insects and worms in the cage to feed the animals whose appetites improve with the coming of spring when they are wide awake. The turtles are fed ants' eggs in the pool.

The vivarium is an interesting Nature study project around which other activities may be centered. An encyclopedia is consulted often for information about the animals in the vivarium. This was the case when the question arose as to the difference between a toad and a frog. The children read juvenile science books and stories in readers to find out answers to questions that arise concerning the animals and their habits.

The finest things obtained from this study are the attitudes of kindness and thoughtfulness developed through the handling of the tiny creatures. These ideas were made more vivid, I believe, by the stories the children wrote. Each child pretended he was one of the little vivarium animals. He told of his experiences within the vivarium, what things he liked, how he was treated and what he observed about the other animals. In this way the children were able to see the animal's side of things. One eight-year-old boy wrote a ten-page story about his experience as a snake. Each animal has been given a name and is claimed by the child who brought it as his particular pet. The children have no feeling of fear when looking at or playing with the different creatures, but they are fascinated with them. Even the mothers like to come to look at the vivarium that they hear so much about. One mother says she was able to overcome her feeling of repulsion toward snakes by coming to the room often to observe them in the vivarium. She is pleased to think that her daughter is not growing up with that feeling of horror at seeing a snake.

From our experience we feel that a good slogan would be "A Vivarium for Every Classroom."

The Pheasant of Ichang

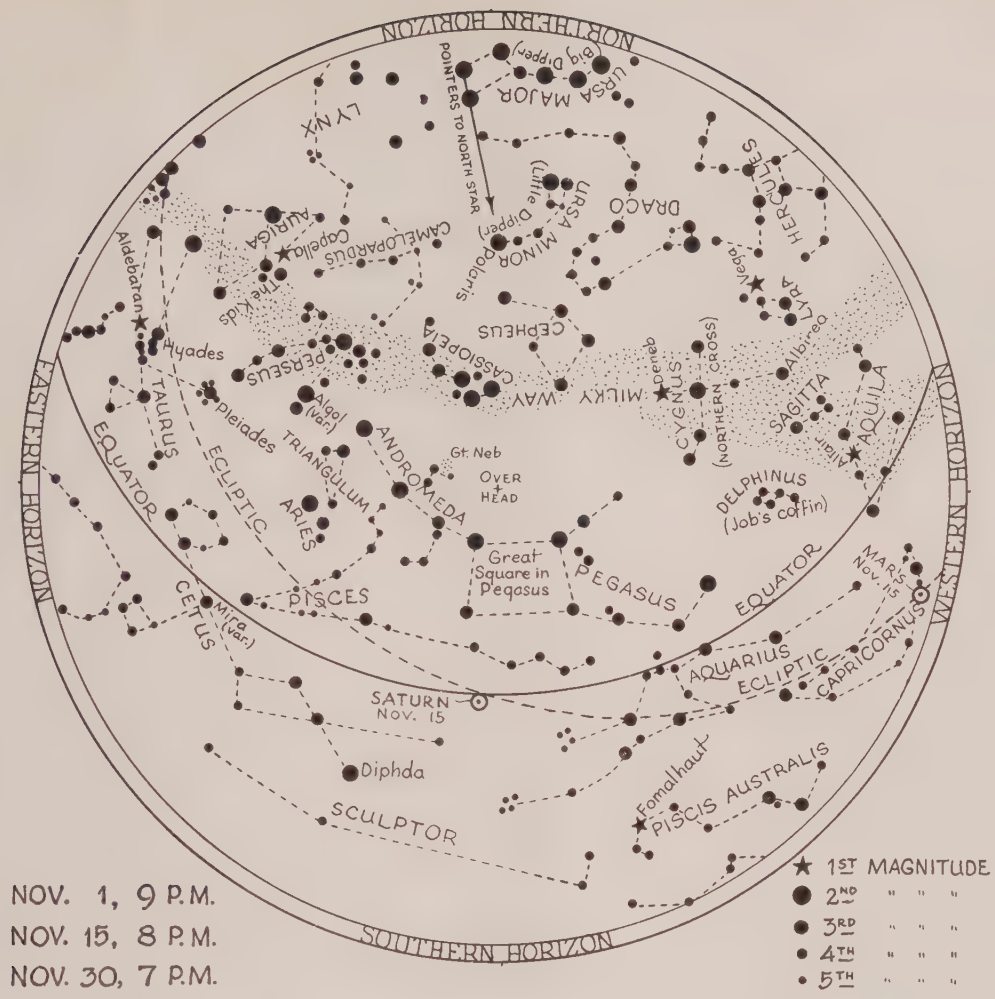
By EDITH M. LAING

THIS unusually artistic stamp carries an excellent likeness of the Reeves pheasant, *Syrmaticus reevesi,* first described by Gray, who made an important study of this beautiful group. The species is supposed to have been referred to by the great traveler, Marco Polo, and in at least one instance is known to have been kept in the aviary of an Englishman living near Hong-Kong, as early as 1808. Some years later a few were sent to the London Zoological Gardens. Attempts to assemble enough birds to form a breeding nucleus were finally successful, and for several decades the species has been bred freely in various parts of Europe.

Reeves' pheasant is a showy species, reddish-brown above, varied with black and white markings. The white crown and throat, contrasting sharply with the dark brown and black of the sides and back of the head, and the greatly-elongated and sharply-pointed tail, with its barring of black and chestnut, combine to form a striking figure. It is the male that sports these gay colors, and the tail is frequently five feet in length. The female, all told, is scarcely half as long, and is much subdued in color.

Reeves' pheasant has long been pursued for sport by those Europeans who have found themselves in its rather circumscribed range in the region of the Upper Yangtze. It is reported to spend much time on foot, and to keep far ahead of the dogs used to trace it. When forced to rise the birds fly swiftly and are bagged only by a good shot. The species is stated to be able to check its flight suddenly, by the aid of its huge tail.

Although this pheasant has been supposed to be held in veneration by the Chinese, this is probably an error, for they capture it in snares on every opportunity, both for food and plumage. It is a vigorous, quarrelsome bird, dangerous to other pheasants and even to its own species. Its mountain habitat has made it a hardy species, and if given plenty of room it can endure considerable exposure to cold.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

NOVEMBER'S METEORS

By ISABEL M. LEWIS

If one is interested in observing "shooting stars" or meteors—a field that affords a fine opportunity for the amateur astronomer to test his alertness and knowledge of the constellations—there are but few evenings in November when members of one or more of four swarms may not appear. In addition to the two well-known swarms, the Leonids and the Andromedids, there are the two swarms known as the Epsilon Taurids and the e Taurids. The names of meteoric swarms refer to specific stars in certain constellations near which the meteors appear to originate. If one has a star atlas it is an easy matter to identify these stars and the approximate positions of the radiants of the swarms. The radiant of the Leonids lies within the Sickle in Leo, near the star Zeta Leonis, and that of the Andromedids near Gamma Andromedae.

In addition to the fact that the paths along which members of the same swarm are moving all converge, when traced backward, toward the radiant of the swarm, it will be noticed that members of the same swarm share the same characteristics of color, speed, and brightness. The Epsilon Taurids, which may appear on any evening from November 1 to 17, are slow-moving and reddish and occasional fireballs appear among them. The distinction between a shooting star, or meteor, and a fireball is chiefly a matter of brightness. If a meteor appears as bright as, or brighter than, Jupiter or Venus, it is generally called a fireball. It occasionally may be accompanied by sounds resembling thunder. If it bursts it is called a bolide. The name meteorite is reserved only for masses weighing anywhere from a fraction of an ounce to a ton or more that escape being consumed by friction with the earth's atmosphere and actually strike the earth's surface. Only one meteorite is

known to have struck the earth at the time when there was a meteoric shower, and that was the Mazapil meteorite that fell on November 27, 1885. It apparently was a member of a swarm of Andromedids and possibly even a fragment from the head of Biela's Comet. The Andromedids are also known as Bielids, because they travel in the same path as Biela's long lost comet and are undoubtedly part of its disintegrated substance. The Andromedids are also slow and reddish and, like the Taurids, appear in the evening. Their slow speed is caused by the fact that they are overtaking the earth on the night side. They may appear any time between November 17 and 27. The e Taurids, slow and bright red in color, radiate from a point a few degrees west of the Hyades, and may be seen from November 3 to 15.

Bright moonlight interferes seriously with the observation of meteors and one should choose, if possible, a time when the moon is absent to look for members of these swarms. As the new moon arrives on November 2 the Taurids will be seen best during the first week in November. As full moon comes on November 18, one will see few, if any, of the Andromedids before November 21.

The Leonids, appearing between November 13 and 15, are met by the earth head-on in the early hours of the morning and are seen to the best advantage an hour or so before sunrise. They are swiftly moving and bluish in color. They follow in the orbit of Temple's Comet (1866 I), with maximum displays every 33 years. Spectacular displays were seen in 1833 and again in 1866, but the shower expected in 1899 did not materialize due to disturbances produced by the planets Saturn and Jupiter that affected the position of the meteors' orbit. Considerable numbers were observed in 1901, however. No great display appeared after another 33 years in 1932 or 1933 and it is probable that the densest part of this closely bunched swarm has been attracted too far away from the earth by the gravitational pull of the planets to afford us more than a mediocre shower at best.

As the flight of a meteor lasts scarcely a second, one will find it is not an easy matter to make an observation of any scientific value. What is particularly desired is the recording of the direction in which the meteor is moving with respect to the stars as points of reference, and one needs to have a knowledge of the principal stars and constellations to make such observations, as well as a quick eye, for the flight is over almost before one notes it. The time of observation to the minute is also of first importance and additional information desired includes the color and brightness of the meteor compared usually to bright stars or planets and any peculiarity such as a train, a phosphorescent glow persisting for some minutes, or a trail of bright sparks. Meteors appear first, according to results of observations made by skilled observers, at an altitude of about 75 miles and disappear at an altitude of about 50 miles, consumed by the heat produced by their encounter with the earth's atmosphere. Fireballs penetrate farther into our atmosphere, generally to a height of about 30 miles above the surface. There is a great difference in the heights of the paths for different meteors. The larger fireballs penetrate farther, have longer paths and lower velocities. Meteorites exhibit many peculiarities. Frequently they strike the surface of the earth with the ordinary velocity of falling bodies. At times they are too hot to handle when they first reach the earth; again they may be coated with ice. Rarely do they bury themselves to any great depth.

One cannot become a skilled observer of meteors without considerable practice. The first step is to learn the constellations, the next is to adopt a scientific plan of observing and recording. The American Meteor Society is prepared to enroll among its members those who wish to engage in meteor observing seriously and to supply them with forms for recording observations. Meteor photography is also an interesting field in which much still remains to be done. In general, the unexpected appearance of the meteor, the fact that it is visible only for a second, or less, and the infrequency of the occurrence, as well as the fact that only the brighter meteors or fireballs will register on the photographic plate, explain why there are so few photographs of meteors in flight. Meteor trails occasionally do appear on plates exposed telescopically for other purposes. A familiar example is that of the meteor trail that appears on the photograph of the gaseous nebula known as N.G.C. 6995. The plate was exposed 5 hours and 43 minutes by E. E. Barnard some years ago.

It has been found that many more meteors are observed in the second half of the year than in the first half, and many more in the hours after midnight than in the hours before midnight. November, as well as August, is one of the most favorable months for observing meteors.

There will be a small partial eclipse of the moon on November 18, magnitude only 15 hundredths of the moon's diameter, visible in the North Atlantic Ocean, North and South America, the Pacific Ocean and northeastern and central Asia. In the eastern time zone the moon will enter the earth's umbral shadow at 2:37 A.M., the middle of the eclipse will occur at 3:19 A.M., and the moon will leave the earth's umbral shadow at 4:00 A.M. The eclipse will be visible, if the skies are clear and clouds do not obscure the moon, in all parts of the United States and Canada.

Mars, Jupiter, and Saturn all will be visible in the evening hours this month. Mercury will be an evening star during the month but will be too close to the sun to be seen. On November 15 Mars will be in Capricornus. In brightness it is now somewhat inferior to Vega and Capella but brighter than Aldebaran. It is slowly receding from the earth and decreasing in brightness and is above the horizon for nearly four hours after sunset. Jupiter is in Sagittarius a few degrees west of Mars and sets about half an hour earlier. Saturn is in Pisces, visible in the east from sunset until it sets in the west after midnight.

Venus is still a Morning Star, passing from Virgo into Libra during the month. On November 15 it rises about two hours before the sun and may be seen low in the southeast before sunrise.

INDOORS AND OUT

(Continued from page 263)

of all was the flight of waterfowl. . . . I was thrilled by the honking of geese. . . . The air was thick with falling snow at the time and I was interested to see that the noble birds were slightly confused by the obliteration of their usual landmarks, for coming straight up the course of the river from Carlisle Bridge, they did not as usual cut across the land just below Davis's Hill. . . . It was perfectly obvious that they discovered their mistake at the precise moment when they came to the sharp bend which the river makes just below the cabin, for at this point the flock was for a moment thrown into confusion by the sudden halting of its leaders."

One envies a man who can write so confidently of what is usual or unusual about a river course that he has made his own, but one can also cherish another sort of envy for the person who can write from experience as charmingly and piquantly of an entire river as Miss Robertson has of the Thames, and "envy" is too boastful a term to use in describing the amazing photographs that Mr. Turner has contributed to *Thames Portrait.* His photographs of swans on the river or nesting in brush as disordered as the swans are elegant, and of sea gulls with a Westminster background will long be vivid in the memory, and it will also be pleasant frequently to remember Miss Robertson's experiences as nurse to moorhens and eavesdropper to priceless conversations. Both text and photographs are surprisingly comprehensive, and I believe a reader can rather certainly feel that he has come to know the Thames from the headwaters, where rival countrymen claim the source, to river's end where old men line the banks to watch the young men work, and where the vessels of the high seas come to harbor.

"There's no frigate like a book," Emily Dickinson declared, and I could testify that these three books that I am suggesting for our November armchair are a small fleet of dream ships, too. I wish that I could write a book about the Allegheny River as comprehensive as *Thames Portrait,* as thorough as *Concord River*; I wish that I could take such photographs as Mr. Turner's, and learn the skill of Mr. Benson's hand; and I wish, too, that I could set as jewels in the text such beautiful poems as Sara Teasdale has written.

WHO KNOWS?

(Continued from page 284)

without any further explanation than that of habit and instinct. It might be reasonable to consider therefore that all human faculties can be regarded as phases in the process of a universal scheme; that both morals and intelligence are not confined to any one creature, but that all living beings are touched with the divine attributes. We ourselves carol of

Little birds which sing and fly
Round Thine altars, oh Most High . . .

but deny Heaven to the animal creation. There are things we readily admit in vague and nebulous theory that we deny vociferously when a claim is made which might belittle, however slightly, the dignity of our own ascendency over the animal world. *Non sono Christiani?* True, Brother Sportsman, but—who knows?

Strange Nesting Place

Lawrence Kriegshauser of St. Louis dropped by the filling station to have his car greased. When the attendant started to work under the machine he found a bird nest firmly lodged at the intersection of two steel cross-members in the under framework. There were three very light blue eggs in the nest, testifying to the fact that the bird must have spent a day building the nest and three days laying eggs. Yet the car had not been idle for more than sixteen hours at a stretch and had just returned from an 800-mile trip to the Ozarks the day before. Unfortunately the nest was not identified by anyone who knows birds, and the local suggestion that it was a wren nest is disproved by the color of the eggs.

A Wandering Child Returns

While it is most unusual for baby wrens to return to their nests after leaving them, Harry E. Hunt of Put-In-Bay, Ohio, witnessed such an uncommon occurrence. He reports the incident to us as follows:

"—We were sitting on the unscreened porch watching the parents feed their brood when our attention was called to a short-tailed baby wren moving toward us over the lawn. It mounted the railing of the porch, and after several ineffectual efforts, worked itself up the left trunk of a V-shaped wild cherry and out on the limb over the hanging bird box. Here it rested for about half a minute, dropped down to the house perch and darted inside."

Ornithology

The Ninth International Ornithological Congress will be held at Rouen, France, May 9 to 13, 1938. On May 6 and 7 questions with respect to bird protection will be considered by the International Committee for Bird Protection meeting also at Rouen. The secretary of the Congress is M. Jean Delacour, Chateau de Cleres, Seine Inferieure, France. Persons who wish to present papers at the Congress must notify him before January 31, 1938, with details as to the title, length and specialized character of the paper, and whether slides, films or other illustration accompany it. Various trips are being arranged in connection with the Congress.

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Nature Magazine in School

A Department of Aid to the Teacher

In order that teachers and parents may further use Nature Magazine as an aid to the study of Nature and Science, this page is devoted to the following brief notes based upon articles in this issue and suggesting ways in which they may be used as a source of inspiration and information. To bring these Nature study thoughts to our readers we have obtained the services of one eminently qualified for the task, and this department is edited

BY ESTHER SCOTT

Instructor in charge of Elementary Science
Washington, D. C., Schools

Incidents of the Wild

Young persons cannot appreciate the beauty and strength of the wilderness unless they have had experience with it either directly or indirectly. Would that teachers could direct this experience so that those who leave their classrooms would feel as the Indian, who said: "the stones, the coyotes, and the stars—they are all our brothers." Teachers who earnestly wish to do this will find a way. Some will read aloud from such books as *Wild Animals I Have Known;* will keep pets in their classrooms; take pupils out into the parks and woods where they will teach them to remain quiet for a few minutes, to listen and become a part of the great outdoors. They will be patient and sympathetic while pupils tell of incidents similar to those in this article. They will know their pupils individually, and, when the opportunity offers, recommend books and articles that will deepen the awakening love of the wilderness.

•

Four Footed Kings

When learning about the talus slopes of a mountain, would it not add much interest to learn of the creatures that inhabit these rocky retreats? A talus slope could be made on a sandtable by breaking some pieces off of a weathered rock, which itself would serve as the "mountain". The "animals" could be modeled out of clay and painted to be more life-like. A background of mountain scenery could be made on a large sheet of construction paper and placed on the wall back of the sandtable to make the talus slope more impressive and also to give problems such as those relating to the height of mountains, the shape of their valleys and how they were formed. Drawings could be made of the interiors of the animal homes and pictures of the animals collected for the science corner.

•

A Peep at Polyphemus

Making an insect cage is an enjoyable project for young pupils. This can be produced from a wooden box over the top of which some cheese-cloth has been stretched or a more elaborate one may be fashioned from lumber and wire netting. In any event it is important to provide a floor that can be covered with moist soil to a depth of about three inches so that caterpillars with a mind to burrow may do so. When collecting caterpillars it is well to observe the kind of bush or plant upon which they were found, because this is usually the kind of food that they require. Place a glass of water covered with paper in the box with the stem of the plant forced through the paper into the water, thus keeping the plant fresh for several days, while the caterpillar may eat without danger of drowning. In teaching the life cycle, one very distinguished teacher of Nature study asks her pupils to draw a circle on a piece of paper and mark it off into four sections. In each section a picture of the stage to be represented is drawn. By numbering the sections one can tell whether the pupils have the stages in the right order. This article gives excellent information for the collection and care of insects.

•

Depression Fur

None of us do enough to present the cruelty and the crudity of the fur business to the young persons in our schools. The social studies offer an opportunity to present much of this material, especially in the unit dealing with fur trading. This particular unit is widely used throughout the United States. In it emphasis should be given to the suffering of the animals in steel traps, the ruthless extermination of fur-bearing animals, the life histories of these animals and the place that such creatures occupy in the interdependence of living things. The first mentioned point may be driven home by the use of carefully selected poems and stories read to the class. Teachers should beware of moralizing on the selections used in this way for to do so would probably defeat their purpose. Pupils will react spontaneously. If they feel deeply, they will talk or write. More mature pupils might attack these questions more from a research standpoint, groups reporting on the Verbail and other humane traps, on the rate of destruction of certain species, on the use of fur substitutes, the prevalence of fur farming, the cost of establishment and the chances of success in this type of farming. At the end of these reports, the class as a whole should formulate a series of recommendations concerning the treatment of fur animals and these should be forwarded to the state game warden, the Governor of the State, and sympathetic adults in the community.

•

The Mountain Heronry

What will future generations think of their forbears who robbed them of the pleasure of ever seeing such a magnificent sight as the mountain heronry described in this splendid article written by one who has devoted his whole life to the study and conservation of our native wildlife. Before reading this article pupils might be interested in finding out some of the heron's habits, in discussing its adaptations, such as long legs, long neck and long, sharp pointed beak. After reading the article they might have a discussion in which they ask themselves if the persons who destroyed the herons realized that they were for all time destroying this colony. Pupils in all grades could make posters emphasizing the need for the protection of this species. The great blue heron would lend itself especially well to the development of an art design. A series of posters could be made and dated showing first the abundance of these magnificent birds and their present scarcity, and another showing their usefulness in maintaining the balance of Nature.

•

The Leaf

Leaves are said by some scientists to be the link between the living and the dead. When these are green and growing, they manufacture food from air, water and earth. When they are dead and darkened in contact with the soil, they give back to the earth the substances they have gleaned from the elements. A simple hand lens will reveal the pores on the under-side of the leaf, through which the air enters. On the part of the leaf stem that was in contact with the twig may be seen the ends of the tiny channels through which the sap flowed, carrying chemicals from the roots. By shading a leaf the necessity of sunlight may be demonstrated. Pupils can appreciate our dependence upon the green leaf as our source of all food, by finding out what is eaten by the animals used by man as food. Leaves are therefore a link between the living and the non-living. The part taken by leaves in enriching the earth can scarcely be comprehended. Some idea may be had by experimenting with composts of leaves on the school garden or by mixing leaves and soil in preserve jars and keeping them moist and moved about frequently to hasten decay. The economy of leaf composts in comparison with commercial fertilizer should be considered. The loss of plant food when leaves are burned should also be discussed.

•

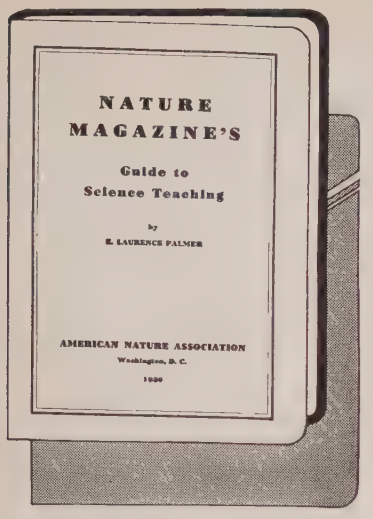
Chebuba

When teachers are looking about for a charming pet to add to the schoolroom zoo, any kind of squirrel will be a happy selection, but a flying squirrel is especially interesting. This article gives excellent information regarding the care of this type of squirrel.

•

The Vivarium

Anyone who follows the directions given in this article can have a successful vivarium. What a wealth of interest it would bring into the schoolroom! How it would promote a good friendly atmosphere between pupils and teacher, to say nothing of the science attitudes that it would develop!



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A Curious Incident

By Fannie M. States

Something that in my opinion was quite curious happened at Lakeside, Ohio, on the Saturday before the political convention held in Chicago in the summer of 1932. Judging from the noise, the birds were having a convention all their own.

There are a large number of trees of various kinds in Lakeside and many birds have their homes in them. For hours—in fact, all of the afternoon and early evening—the noise made by the birds was extraordinary. Not one bird was allowed to have his say in a polite way. It sounded as if all wanted to speak at the same time. And such things as some were saying! There were no sweet chirpings or twitterings, no trilling or singing.

Birds of that assemblage could have taken no time to gather food for their young or even to have swallowed a bug or worm themselves. Of course, there's a possibility that the mothers—like human mothers—were attending to the necessary and ordinary business of the day while the fathers were at the convention, but the volume of confused and urgent pleadings and scoldings would lead one to believe that all were there.

The jays talked the loudest and perhaps had more to say than any other kind of bird. Such angry tones! The woodpeckers ranked next in eloquence, but these weren't the only ones. From the tumult one would conclude that the wrens, sparrows, robins, cardinals and bluebirds were also there and were joining in the discussion. Such a peeping, scolding, pleading! Often a number of voices could be heard at the same time. It was interesting but far from restful. Sometimes a bird rapidly and forcibly repeated the same sound again and again. I failed to determine whether the cry was "Liar! Liar! Liar!" or "Thief! Thief! Thief!" Perhaps it was "Scoot! Scoot! Scoot!" It is certain that there were no pleasant notes from the birds that whole afternoon—just troubled noises. They were of different degrees of harshness and differed in pitch, but all the birds were complaining about something. That was plain. There was a pleading note in the talk of a few, as if they were trying to make their point by touching the sympathies.

"What was the cause?" do you ask?

It is quite likely that the "convention" was called to rid the place of some enemy, possibly a cat, but more likely an owl, for by the time the place was clothed in darkness the group had broken up and peace reigned. Finally only a mild peeping or twittering could be heard at intervals.

A second convention was not held that summer. Evidently Mr. Owl was convinced that he was not to be made king, and, as soon as a favorable darkness came, must have elected to seek a more pleasant and congenial locality.

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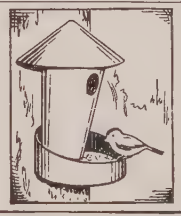

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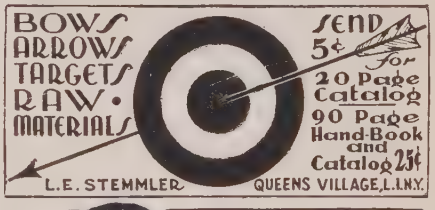

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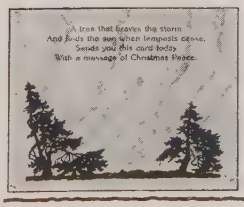
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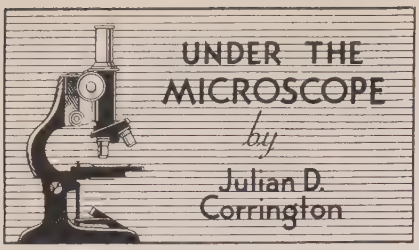


Presswork

With the departure of summer and the golden days of autumn, the microscopist's attention turns to those subjects which form matters of interest at any season and have no relation to the weather outdoors. That's one of the great advantages of microscopy as a hobby—an abundance of material for work at any time of the year. It is good practice to go in for natural history from March to October, collecting an accumulation of objects the excess of which is stored for mounting, study and photographing during the long winter nights; but there are in addition many lines of investigation suitable for inclement periods, whenever these may come.

One such project that is simple and yet most interesting is that dealing with the many methods of reproducing illustrations for publication. This might seem a rather narrow and specialized field until we recall the army of persons engaged in advertising, publishing, engraving and printing, and the vast sums spent yearly in selling to the public via the arresting medium of pictures. When we include also the popularity of picturized news and the demand for illustration of fiction, true story, travel and what not, one begins to get a glimpse of the enormous ramifications of this business.

The artist, whether draftsman, painter or photographer, is the most important cog in the wheel and yet he is only the starting point. Before his production can be utilized it must be processed in some way to permit manifold *reproduction,* and the method selected must be correlated with the type and quality of paper to be used, the fidelity of copying required and the cost. All methods are expensive, but some much more so than others and thus choice of process is an important consideration, to be justified according to the medium and the patronage desired.

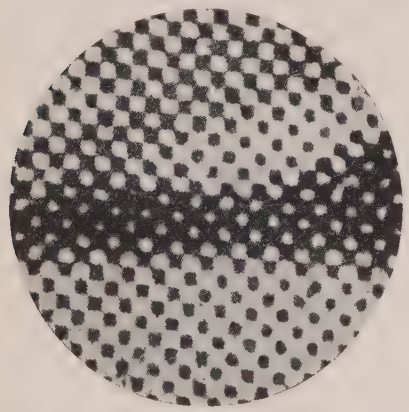
Microscopes are essential in making the various plates used in printing illustrations; —so much so that one form of simple microscope has received its name through this usage—the engraver's glass. Our interest in this subject will lie, however, in reversing the procedure and inspecting the finished and printed product. In this way much can be learned of the *modus operandi* of the many methods in vogue today.

Let us begin with black and white and thence progress to color reproduction. On page 307 of this magazine appears a line drawing which was done with pen and ink and was copied by means of a zinc etching, commonly referred to as a "cut." A plate of zinc is eaten by acid at all points except where lines and dots of the original drawing occur, leaving these as elevated areas which alone take the ink from the press. Examine this reproduction under low magnification and note the entire absence of a *screen,* sure indication that a zinc cut was used. This is by far the least expensive method and does not require a high quality of paper, hence is always employed wherever at all suitable for the purpose in mind.

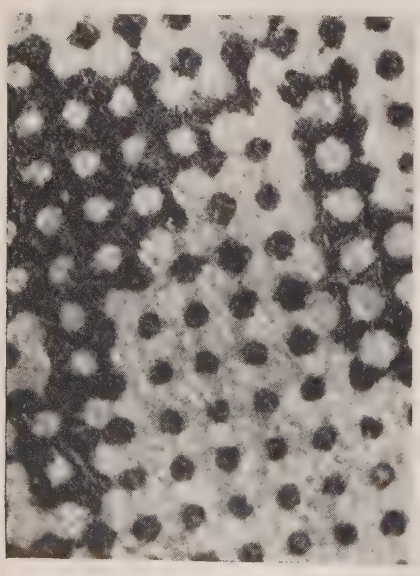
In studying illustrations a hand lens is often sufficient and if you do not have such an instrument, remove the eyepiece from your compound microscope and hold it inverted, in which position it forms a good magnifier for a limited field. If the compound microscope is used, employ only the lowest power of objective and eyepiece available, and with reflected, not transmitted light. We would recommend the purchase at this time of a projection eyepiece for your microscope;—the very low magnification it provides is useful at all times, and especially for the stunts in microprojection and photomicrography that we plan to discuss shortly.

Permanent slides are quickly made. Cut out a portion of an illustration about one-half inch square, place in a watch glass of xylol for a few minutes, then drain and mount in balsam. Dry the slide and label as to type of presswork reproduction. A collection of the different forms described herein will make an interesting addition to your slide library.

Aside from zincs, all other forms of art work, as photographs, wash drawings, pencil, crayon, pastel and paintings, formerly



HOW A NATURE MAGAZINE HALFTONE, 120-SCREEN, LOOKS THROUGH THE MICROSCOPE. BELOW A COARSE SCREEN NEWSPAPER HALFTONE



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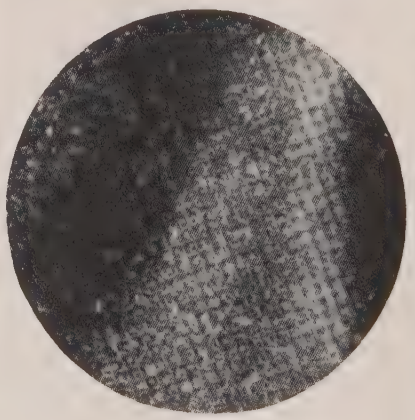
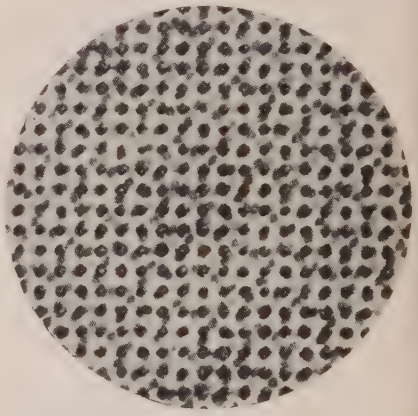
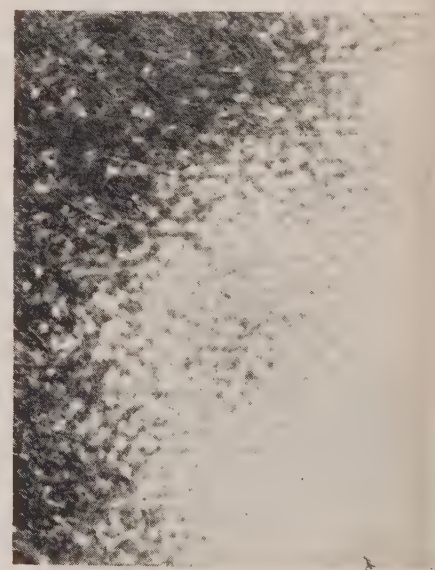




LOOK AT THE REPRODUCTION OF A FOUR COLOR, HALFTONE PICTURE THROUGH THE MICROSCOPE AND YOU WILL SEE THE ABOVE



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MICROSCOPE BOOKLETS

Three pamphlets of interest to the user of the microscope, or to anyone planning to purchase such an instrument, are available from the "Under the Microscope" Department of Nature Magazine. Ask for "Microscope Booklets" and send a three-cent stamp to JULIAN D. CORRINGTON, Nature Magazine, 1214 16th Street, Washington, D. C.

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capable of manifolding only by the highly skilled, tedious and very expensive method of lithography, are today reproduced with speed and relative cheapness because someone discovered an optical illusion. Clap a lens over one of the "photographs" of glassware on page 278 of this issue, and what do you see? Why,—it isn't a photograph at all! Just a meaningless series of black dots, varying in size and spacing! But the wonderful part is that these jumbled dots, when viewed without magnification, produce the illusion of a beautifully finished photograph.

Copying this sort of work in black and white—technically light and shade—is done through the medium of the half-tone screen. This is a thick plate of glass on which fine black lines have been carefully ruled under a microscope, and they vary from coarse screens with fifty lines per inch, suitable only for newspapers, to the finer and more expensive types, up to four hundred lines, which require very fine and smooth paper for satisfactory print jobs. Space prevents a full description of this fascinating technique, but you will find it in all encyclopædias; see printing, photo-engraving and process work.

Rotogravure and color reproduction are even more interesting. Make a slide from the cover of a fiction magazine, with its omnipresent girl's head or bathing beauty, selecting the skin of the face as the part to mount. It may resemble warm flesh to the naked eye but it's only a maze of colored dots under the microscope. This method, a most ingenious invention, is termed the three-color process and is done by taking three separate photographic exposures of the original painting, each through a color filter as well as through a 120-line or 133-line half-tone screen. A strong red filter transmits only the blues of the original, a blue filter records only yellows, and a green filter only reds. Three engravings are made from these plates and their impressions, each with the proper color of ink, are superposed in printing. There is also a similar four-color process.

Among the latest developments of the printing trade are plates made by photo-lithography and printed by the offset method, with or without screens according to the nature of the subject, the camera and microscope combining to displace the older skilled hand worker by modern machine technicians. These subjects, too, in an encyclopædia, will provide highly interesting reading for one of these winter evenings when you're in the mood for keeping up with this machine-age world.

Examine as many types of reproduced work as you can find. Try out stamps, bank notes and fine steel engravings; etchings, cheap cartoon work, newspaper Sunday supplements, old wooden block prints, linoleum block work, and compare originals, as photographs, drawings and paintings with these various reproductions. We think you will greatly enjoy this novel microscopic excursion.

GADGET DEPARTMENT

One doesn't make many of his own slides before realizing the need for some form of slide dryer. This piece of equipment may be purchased if desired but we recommend that you make your own and save shekels for other necessary apparatus that is not as easily constructed.

The principle is to employ any form of

For Christmas

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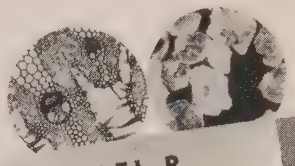

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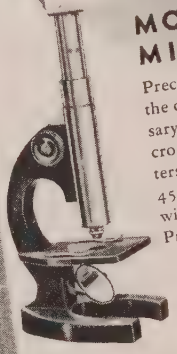

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gentle heat to evaporate the xylene in which the balsam is dissolved. Balsam is a resinous solid and is prepared for microtechnical use by stirring in xylene to the consistency of a thick fluid. When the xylene is driven off, the balsam is again a solid and the slide permanently dry for use or storage. Heat hastens the process so that a slide which at ordinary room temperature would require a week for solidifying may be finished in a dryer in two days.

Some form of metal container provided with a flat shelf is indicated, the heat source being a 40-watt electric bulb suspended within. There must be several small vent holes to allow excess heat to escape. One of the best devices for conversion into a slide dryer is one of those cubical tin ovens designed to be placed on top of a gas or oil burner that lacks regular oven equipment. One such that we have used was provided with a hinged glass-front door, two adjustable shelves of wire mesh and ventilator holes. Next best would be a rectangular five gallon can, the common receptacle for motor oil, maple syrup and similar commodities. If you like soldering, a box is readily constructed from galvanized iron sheeting.

Shelves should be perforated to give circulation of heat, galvanized screening of wide mesh being recommended. The whole dryer may be made of this wire gauze if designed to place over a radiator or hot air register in winter, but this type is useless in the summer. It is important that slides be kept absolutely flat until they are completely hard, otherwise the material may float to one edge of the cover glass or even entirely off the slide.

ADVANCED HINTS

Dehydration and clearing agents have always constituted a source of difficulty for the amateur, who usually does not have access to the complex apparatus and facilities of a chemical laboratory and who is unable to secure tax free and chemically pure grain alcohol. The original and still ideal method of processing material is to extract all of the water by passing from commercially "pure" (95 percent) into chemically pure (100 percent or absolute) alcohol, thence to xylene.

The above described carbol-xylene technique is one of the best of many ways of getting around the lack of or expense involved with absolute alcohol. Specimens are cleared directly from 95 percent alcohol in this reagent, the carbolic acid having a very high affinity for water and completing the dehydration. Other chemicals that will clear from 95 percent alcohol are turpentine, beechwood creosote and anilin oil.

Euparal, known also as Diaphane, is a mounting medium and clearer combined. Objects may be transferred from 95 percent or even lower alcohols directly into this mountant; but it is expensive. Finally, one may make his own absolute alcohol by placing in the bottle some lumps of unslaked lime (calcium oxide) or copper sulphate, which will extract the water. Keep the stopper coated with a thin film of vaseline to prevent entrance of moisture from the atmosphere.

HISTORICAL OUTLINE

Who made the first microscope? When were microscopes in some form first used? These and similar questions of primary origins must forever remain unanswered, lost in the misty past. And yet we do have a few clues that are of great interest.

It is held by many that the beautiful and intricate gem carving of the ancients could not have been executed without magnification. Sir John Layard, while excavating ruins of the Palace of Nimrod at Nineveh, discovered a plano-convex lens of rock crystal, dating from somewhere around 715 B. C. The Chinese are reputed to have employed spectacles as early as the Confucian era, 500 B. C. The Roman philosopher, Seneca, tells how letters and other objects appear larger and more distinctly when seen through a glass globe filled with water.

But in spite of these and other such assertions it is not at all positive that the ancients had any knowledge of lenses or magnification. Indeed, Dr. Gage writes "All who have made a study of the question are unanimous in the opinion that optical instruments, other than mirrors, were unknown to the ancient world; and that lenses were wholly unknown."

Apparently the first definite record of lenses is the description given in the Opus Majus (1266-67 A. D.) of Roger Bacon, wherein he mentions the use of curved glass surfaces both as magnifiers and as aids to failing vision in the old. So both magnifying glasses and a form of spectacles were in use prior to this date, but for how long and by whom discovered is not known. By about 1275 A. D. spectacles were reported as commonly employed among the educated classes of China by Marco Polo, and from the 14th Century onward they became increasingly abundant throughout Europe. At first they were single biconvex magnifiers held in a bone frame with a handle; later two were hinged across the nose, leaving the hands free.

TRADE NOTES

In connection with the opening installment of our *Historical Outline* on the microscope, we are pleased to announce the first of a very carefully prepared and beautifully executed series of informational booklets by the Spencer Lens Company, Buffalo, N. Y. Bearing the title *The Evolution of the Microscope*, this pamphlet of 24 pages and 24 illustrations presents the subject in condensed and interesting fashion. You will especially enjoy the many pictures of early and crude instruments and their gradual perfection through the centuries, the descriptions of blind alleys followed by Eighteenth Century inventors, and the important contributions of Charles A. Spencer, the first American maker of microscopes. Send a three-cent stamp to NATURE MAGAZINE for your copy.

How to Use the Microscope is a small volume by the Rev. Charles A. Hall, well known British author of popular science and nature study books. Use of simple and compound microscopes and their accessories are explained, together with chapters on preparation and mounting, photomicrography, and a discussion of the commoner objects favored for study. Well written and informational, this is one of the best of the shorter British works on microscopy. The Macmillan Co., 60 Fifth Ave., N. Y. C., $1.25.

The beginner in microscopy thinks only in terms of high power, while the experienced worker knows that his problem more often than not is to get sufficiently *low* power with a compound microscope to see the whole of an object. This is true with a host of mounts,—insects, plant parts, textiles, and particularly in projection and photomicrography. You can buy an especially low power eyepiece,--generally termed a projection ocular—for whatever make and model microscope you own, and they are not expensive. For example, Bausch & Lomb provide a low power eyepiece for their miniature models,—the Gem and R microscopes,—at $3.50.

Among American science classics is *A Manual For the Study of Insects,* by Prof. J. H. Comstock, first published in 1895; an entirely new sort of work at that time, written when entomology was in its infancy. It has been a standard ever since and now, in its twenty-first edition, the work of revision taken over by Dr. Comstock's former student, Prof. Glenn W. Herrick, the *Manual* marches on, as indispensable as ever to those interested in the study of insects. Comstock Pub. Co., Ithaca, N. Y., $4.00.

Books on microscopic anatomy are legion and mostly voluminous. One of the most condensed of the complete works we have seen is that of Joseph Krafka, *A Textbook of Histology;* distinctly modern in presentation, content and illustration, decidedly technical and yet easy to read and very interesting if one has the proper background in general biology. We can unhesitatingly recommend this volume to the advanced student who knows a bit of vertebrate anatomy and wants to explore the cells and tissues of the human body with a microcope. The Williams and Wilkins Co., Baltimore, Md., $2.50.

Under the Microscope is a department of NATURE MAGAZINE designed for those readers interested in microscopy and maintains a service to render assistance with problems in this field. You are invited to take advantage of this service. Address all inquiries to Julian D. Corrington, NATURE MAGAZINE, 1214 Sixteenth St., N. W., Washington, D. C.

Sincerely,
JULIAN D. CORRINGTON.

Education

Attention will be focussed on the vital part that education plays in the American democracy during the officially designated American Education Week from November 7 to 13. The observance is sponsored jointly by the United States Office of Education, the National Education Association and the American Legion. The National Education Association suggests the following things to do during the period of the observance: [1] Suggest that your minister devote his sermon for November 7 to the topic for this day, which may serve also as an Armistice sermon. [2] Suggest that Sunday school classes and young people's groups devote their meetings to this topic. [3] Let school choruses take the place of church choirs. [4] Suggest that regular and special religious radio broadcasts discuss the topic. [5] Discuss ways in which the schools and churches can cooperate to further goodwill and understanding. [6] Let pupils in their classwork prepare articles for church bulletins and talks to be given before church groups.

Diana Thorne's DOG COLUMN

THE GERMAN SHEPHERD, or "police dog", as he is popularly known, finds himself in adventure and heroic rôle more often than others of his tribe mainly because he is now the top-ranker among the breeds that are used in olice work, in war work, in Red Cross service and as guardians for the blind. Due to his nervous and sensitive temperament the German shepherd has suf-ered much misunderstanding by those of the public who myopically see in every l in a dog certain evidence of rabies, or at least viciousness!

This breed, if properly fed and cared for, and if owned by one who appreciates s qualities and peculiarities, is one of the most loyal, gentle, clever and depend-ble. If neglected or mistreated it is naturally difficult to deal with.

Many a fine animal has been killed (and so made happier) for no other reason an that his master failed to understand him. Quite recently one was destroyed y the S. P. C. A. simply because, in obeying his master's instructions, he was e innocent instrument of loss of the man's life solely through the man's own umsiness!

His intelligence and aptitude for instruction and training mark the German shepherd especially for the work of leader of the blind. Nothing is more wonderful than to watch one of these dogs leading a person through danger-ous traffic. Their devotion to their charges, their sense of responsibility and their acute observation of human con-ditions are pathetic.

"Rin Tin Tin" earned for himself the title of the screen's most famous g hero. He thrilled juvenile audiences by his daring rescues and hair-raising apes from danger. The "movies" came to give him opportunity for fame de-ed to his predecessors.

In the work of sheep-tending these dogs acknowledge no superior in the collie! ey have tended flocks for so many years that the popular idea that they have wolf-strain in their blood is disproved by that very fact. An infinitesimal mnant of the primal instinct would be enough to make them useless as shepherds.

Historically the German shepherd is one of the oldest of breeds. His pedigree ould be an enviable one in a human. The Romans mention him in their records. e has been a straight breed through the centuries.

Given proper exercise and, above all, the care of an equally intelligent master, is dog will do well anywhere. Placed in a city apartment, without sufficient ercise and with indifferent diet, he is likely to cause trouble. And is *he* to blamed?

One of the most intelligent models I ever had was one which had been pre-nted to and owned by the former King of Siam while in America some time ago. The drastic quarantine laws of Britain as ap-plied to dogs practically operate to prevent one from taking one's dog into that country.

Hans, left behind by his royal master, pined un-til he died. All possible affection by his caretaker was to no avail. It may not be easy to breed and raise and train a German shepherd in a city today; but it is the supreme test of ability for a dog-lover, and there is great pleasure in its accomplishment.

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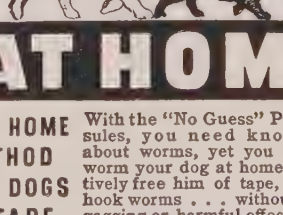

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NATURE IN PRINT

As a convenience to readers the books reviewed in this department of Nature Magazine may be ordered through the book department of the American Nature Association.

A Splendid Book

Natural History is the descriptive although perhaps unimaginative title given to an impressive volume edited by Charles Tate Regan, Director of the British Museum of Natural History, and published in this country by Hillman-Curl, Inc., 66 Fifth Avenue, New York City. With nearly nine hundred pages, sixteen color plates and more than one thousand outstanding illustrations, monumental seems to be the appropriate, although overworked, adjective to describe the volume. In other words it is a thorough, up-to-date, excellently illustrated natural history. The volume is divided into logical sections, starting with the invertebrates other than insects. This section is done by G. C. Robson of the British Museum. D. Aubertin, entomologist of the Museum, contributes the insect section; the editor himself, Dr. Regan, that on fishes; E. G. Boulenger, Director of the London Aquarium, that on reptiles and amphibians; W. B. Alexander of Oxford the bird section; R. I. Pocock the mammal section. The treatment is popular, and an excellent index is included. This fine volume sells for six dollars, which is astonishingly low for such a work.

The Sea-Horse

Irmengarde Eberle and Else Bostelmann have collaborated in a charming little book called *Sea-Horse Adventure,* a fictional treatment of the life of this fascinating little fish with the equine appearance. On four oceanographic expeditions of the New York Zoological Society Mrs. Bostelmann has spied on the life of the ocean floor off Bermuda. Peering through the little windows of a diving helmet, she has gathered the material that formed the basis for the illustrations in the book. In fact, these illustrations take up about half of the white paper in the book, which is published by Holiday House at two dollars a copy.

For Rock Gardeners

Rock gardeners will find much joy and value in *North American Rock Plants* by W. H. A. Preece. This volume is a significant addition to the literature of this special gardening field, and the author has drawn upon his own extensive experience as a rock gardener for his material. Not the least attractive feature of the book are one hundred splendid photographs by A. Nicholls that supplement the text. This volume is published by Macmillan and sells for $3.50.

Perkey

This is the title of a biography of a whole family of little skunks and their mother, a third book on her animal friends by Agnes Akin Atkinson. The story includes many other animals that come to feed at the rock at the back of the Atkinson home in California. These visitors show no fear of their hosts, and, stranger still, no fear of each other while at this friendly place. The book is written specially for children but is equally of interest to adults. It is illustrated by twenty-three remarkable photographs taken by Dr. Spencer R. Atkinson. It is published by The Viking Press at $1.50.

Cats

Not long ago Miss Frances E. Clarke, Director of Education for the American Society for the Prevention of Cruelty to Animals and for the American Humane Association, compiled a book of great dog stories. Now she has compiled a companion volume of great cat stories of our day under the title *Cats and Cats.* A distinguished list of authors is included within the covers of Miss Clarke's excellent selection, and NATURE MAGAZINE is pleased to be represented by Howard J. Shannon's "An Ishmael of the Ocean Beach" used in our January, 1937, issue. Here is a volume that will be a delight to cat lovers everywhere. What more can we say other than that the book is published by Macmillan and that it sells for $2.50.

Ranger

John Riis, one of the sons of the late Jacob Riis, became a Forest Ranger and he has written a fascinating story of his experiences in *Ranger Trails.* The period covered in the book is in the early days of the Ranger service and in the formative days of the National Forest organization. It was a time full of excitement; a period when there was much animosity bred of ignorance of the objectives of the Forest Service. It was a fighting time out on the ranger trails and John Riis was in the front line. Beside being splendid reading, this book has much historical value. It is printed by the Dietz Printing Company, Richmond, Va., at two dollars.

Progress of Science

In *The Advancing Front of Science* George W. Gray takes the reader into the research laboratories where men and women are studying, experimenting and delving into the unknown and unexplored. The result is a volume that makes fascinating reading and brings one up to date with respect to what is going on in the field of scientific research in this country today. The author deals with many things that are little publicized and little known to the average layman, but which are, nevertheless, of great importance both now and potentially. This is not a scientific treatise, nor is it an attempt to cover in detail any of the highly complicated and specialized fields of endeavor. It is a layman's book and highly valuable as such. It was, in fact, chosen as the Scientific Book Club selection for September. The volume is published by McGraw-Hill Book Company and is priced at three dollars.

A Garden Diary

Those who find joy in their gardens and in garden literature will find *A Country Garden* a delightful experience. The author is Ethel Armitage and the treatment is in diary form a record each day when some event of interest, inspiration or significance took place. Bird lover, as well as garden lover, the author gives us many charming bits of ornithology. Twelve engravings by John Farleigh add interest to this attractive book, published by Macmillan at three dollars.

All About Tea

The Field Museum of Natural History in Chicago has brought out twenty-one leaflets on botanical subjects, the latest of which is *Tea* by Llewelyn Williams, Curator of Economic Botany. This leaflet, which sells for twenty-five cents, treats with the history, origin and culture of this evergreen shrub of Asia, presenting the story in popular and entertaining form.

Range Plants

Although designed primarily for forest rangers and others having to do with the administration of our vast Western rangeland, the *Range Plant Handbook,* just prepared by the U. S. Forest Service, should be a welcome addition to the libraries of all those whose interest in the outdoors makes the identification of our common range plants a necessity. For the first time, precise information regarding identification of important forage plants, as well as the extent to which they can be grazed, has been gathered together in one book.

In the past, large sections of the Western range country have not been treated in botanical manuals, and workers in those localities were forced to depend on fragmentary works, few of which were illustrated, most of them couched in such unfamiliar technical language as to be almost incomprehensible from the layman's point of view. The new *Range Plant Handbook* now makes this knowledge available. There are 841 pages of text, with 294 illustrations, 18 in color, and nearly all made especially for this book. These illustrations are unique in that they show, with the accompanying text, key characters of species so that anyone untrained in botany can distinguish these characters plainly. The book not only serves to identify range plants, but gives in concise form all the information about them in existence. It presents 339 generic and specific write-ups, incorporated with which are notes on over five hundred additional species.

An excellent work, intended primarily for busy field men who are not specialists in botany, it enables the reader to identify important range plants, and presents in understandable and complete form the relative importance of these plants from the standpoint of their grazing, recreational, and watershed-protective uses.

Because of the expensiveness of the book, neither the Department of Agriculture nor the Forest Service has copies for general distribution, but bound copies can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for $2.50.

Garden Calendar

The Four Counties Garden Club, Bala-ynwyd, Pennsylvania, is planning to issue Garden Calendar for 1938 in which, for ch day of the month, are suggested gar-n hints to keep your garden in tip-top ape throughout the year. The attractive lendar, looseleaf, is printed on heavy paper, ze twelve by nine inches, and contains valu-le information on planting, fertilizing d caring for all kinds of plants. Similar the 1937 calendar in form, this Garden alendar contains many new notes and sug-estions. It is available for one dollar from Irs. T. Williams Roberts, Pencoyd Farm, ala-Cynwyd, Pennsylvania.

Grand Canyon Birds

Number Eight in the series of natural istory bulletins of the Grand Canyon Iatural History Association of Grand Can-on National Park is a check list of the irds of that National Park. The bulletin as compiled by Russell K. Grater. It is vailable from the Association for twenty-ve cents.

Zion Plants

Bulletin Number One of the Zion-Bryce Iatural History Association is an excellent 0-page pamphlet, fully illustrated, on the lants of Zion National Park. Vegetation, imate and the families of plants represent-l in this region are discussed, and the amphlet should prove valuable to those de-ring authoritative information on this articular subject. Other bulletins will be ublished at irregular intervals; those de-ring advance notice of future bulletins ould send their names and addresses to the itor, Park Naturalist C. C. Presnall, Zion ational Park, Utah. Bulletin Number One, riced at fifty cents, also is available from m.

Praises for WPA Workers

Liberal acknowledgement of the effective sistance that the Works Progress Admin-ration gave to the Field Museum of tural History, Chicago, enabling that in-itution to forward an extensive program at otherwise might not have been under-ken for years to come, has been made Stephen C. Simms, director of the useum, in his annual report for 1936. The nployees' working time aggregated 230,-00 hours. While many were clerical orkers, one notable exception was Dr. E. urray-Aaron who classified many unde-rmined butterflies and moths in the luseum's collection.

Faunas of Canada

In our September issue we reviewed an cellent little booklet with the above title, e work of Dr. R. M. Anderson, stating that was available from the Department of ines and Resources, Ottawa. We now dis-ver that only a few copies of this were inted, and that it is not generally available cept in *The Canada Year Book, 1937*, of hich this reprint is a part. The Yearbook is ailable at $1.50 a copy from the King's inter, Ottawa, Canada.

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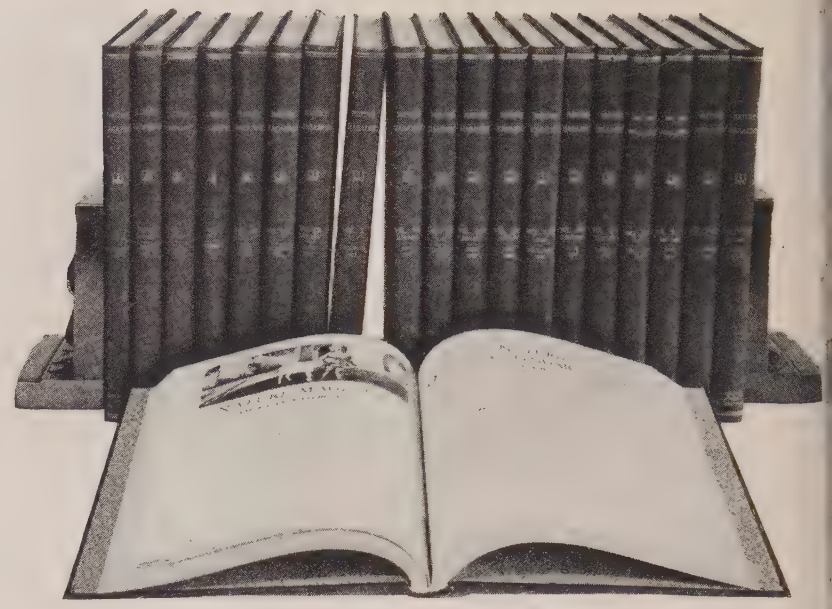

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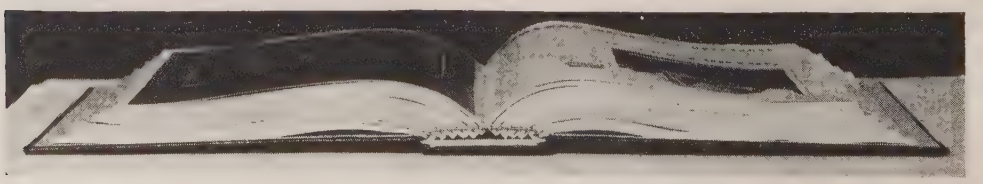

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Photographic Notes

BY SAMUEL BROWN

Greeting Cards

The season of cheer and good fellowship comes again. This year our friends and families will receive greetings from us and the more personal and unusual that they are, the longer they will be kept and remembered. Photographic greeting cards are not difficult to make. With a new idea, a little originality, some patience and care, a card that is entirely different and distinctive may be made with out much trouble.

The first thing that is necessary is the basic idea and possibly the production of a sketch from which to work. It is wise to get the idea down on paper and then elaborate on this when actually making the negative from which you will finally work.

Now for some suggestions. A silhouette always is attractive. This may be of the person sending the card, of two or three figures, of your pet or even some inanimate object. The negative may be printed on the upper half of a piece of 4″ x 5″ double weight paper and the sentiment and signature written or printed on the lower half. This is a simple personal greeting card that is easily prepared. Sometimes it is preferred to use regular pictures in place of silhouettes and this is to be desired especially in the case of the baby's picture.

Still life offers an unlimited range of possibilities. A few props purchased in "the five and ten" are all that is necessary. Among your necessities you will want a set of wooden cut out letters, a figure of Santa Claus, several pine trees, a wreath or two, a sleigh with reindeer and a bundle of cotton to represent the snow. With these items it will be possible to make several settings and then choose the best one or two for use. A bridge table may be used to work on. Set up the various props according to your ideas and light with one or two photofloods. As a suggestion, the table may be covered with the cotton and the trees set up as a background (be careful to place several clumps of cotton on the branches to give the appearance of snow). In front of this, the sled and reindeer may be placed together with Santa Claus and his bag of toys leading the procession. Photograph this set up and use the picture for the main illustration. Secondly, the sentiment is spelled out with the cut out letters and photographed, and this used in place of a written greeting. If 8″ x 10″ paper is used, this may be cut in two pieces the long way to make two 4″ x 10″. The picture may then be printed on one side and the letter negative on the other. When finished, the card is folded with the illustrations on the inside making an attractive double card.

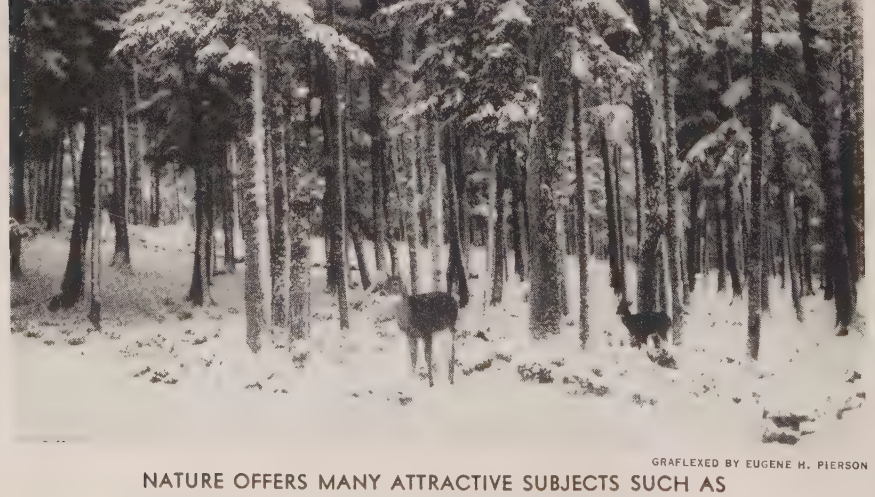
A SIMPLE GREETING CARD SUCH AS THIS IS ATTRACTIVE AND IS LONG REMEMBERED

Another way to work with inanimate objects is on a piece of ground glass. Here a large piece of glass is secured, laid out flat and lighted from underneath. The various props are then placed face up on the glass, leaving them in silhouette. Many odd and apparently impossible effects may be obtained in this manner. A figure holding his hands out may be shown balancing a group of letters spelling out the greeting or several objects may be so placed as to give the appearance of an acrobatic act. When a silhouette effect is not desired, the set up may be illuminated from above or a combination of both may be used.

Greeting cards may be finished in many ways and made attractive by folding, coloring, toning or trimming. We have already mentioned the single and double card. The French fold, being two folds resulting in a four page card, is made best on a piece of single weight 8″ x 10″ paper. This is printed on two or three sections and folded so that the back remains blank.

Cards may be decorated with a small design of holly and a wreath and colored red and green to give the real Christmas touch. If time permits, the picture may be colored. If a snow scene is used as the main illustration, the whole card may be attractively toned blue. Regular photographic stains are available for coloring the whole card. If a deckle edge trimmer is available, the cards may be trimmed with this to add to its appearance. Double weight cards may be embossed or plate-sunk by making an impression around the picture with a dull pointed stick. Double and French folded cards may be punched and tied with appropriately colored ribbons. Be careful in the choice of an envelope since this will make the first impression.

We have offered a few suggestions in connection with Christmas greeting cards, and the reader can no doubt add to these to produce an entirely original one. It might also be well to remember that there are other occasions during the year when greeting cards may be made. A personal card is always more attractive than those commercially sold. And in closing, a hint to the enterprising amateur photographer: Christmas spending money may be earned by taking orders for cards from friends who haven't the time to make their own.



GRAFLEXED BY EUGENE H. PIERSON

NATURE OFFERS MANY ATTRACTIVE SUBJECTS SUCH AS THIS DURING THE WINTER MONTHS

Exposure

This month we bring to a conclusion our discussion on exposure by explaining the factors of film speeds, and prevailing outdoor conditions such as weather, time of

day and time of year.

The film used is one of the biggest factors affecting exposure. Emulsions manufactured many years ago were slow and long exposures were necessary. Today high speed films have been developed with which it is possible to give surprisingly little exposure and still get good negatives. Films were discussed some time ago in this department, but a brief résumé is in order.

Orthochromatic films are fairly fast, allowing short exposures outdoors, particularly during the middle part of the day. Indoors under artificial light, they lose much of their effective speed due to the abundance of red rays to which they are insensitive. Panchromatic film, especially those of the supersensitive type, are extremely fast during all the daylight hours and under artificial light. Fine grain panchromatics equal the orthochromatics in daylight and are slightly faster in artificial light, although not quite so fast as the "superpans".

The best time of year for short exposures is during the summer. The light at this time is extremely strong in actinic power, particularly during the middle hours of the day. There are some variations, influenced by clouds and the weather. With clouds over the sun a longer exposure is required than with a clear sky. As long as the sun throws a shadow, extremely short exposures may be made. With clouds obscuring the sun, but with patches of blue sky showing, an intermediate exposure may be given. During dull overcast days a fairly long exposure is required. Late afternoon and early morning hours require extra exposure when orthochromatic film is used because, even though the sunlight is strong, it tends toward red. During these hours panchromatic film should be used.

During the summer, many pictures are made on the beach. Here we have extremely bright reflecting surfaces in the water and sand, and extremely short exposures are necessary. One fiftieth of a second at F.22 on a slow panchromatic film is not uncommon.

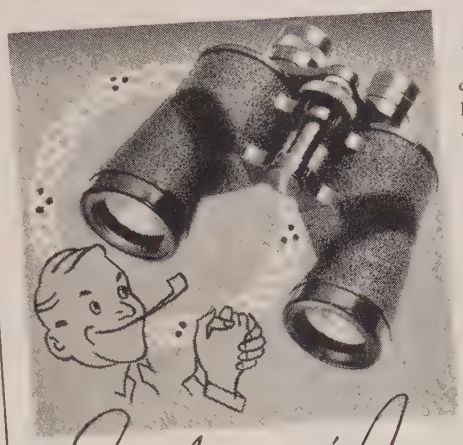
Autumn and spring are about equal as regards actinic power. The sun is not quite as strong as during summer and only the four middle hours of the day are sufficiently strong for high shutter speeds or small diaphragm openings. Earlier and later the sun is yellow and orange. However, this season is conducive to outdoor activities such as hiking in the country and mountain climbing. These subjects in themselves require short exposures, particularly the latter. Mountains as a rule are photographed over great distances and reflect considerable light. Ordinary subjects will require about twice as much exposure during these seasons as would be necessary in the summer.

The winter only permits two or three hours during the middle part of the day for short exposures. Ordinary subjects should be given about twice as much exposure as required in the autumn. When photographing objects in the snow, however, exposures are short due to the tremendous reflection power of the snow. Be liberal with exposure, particularly during morning and afternoon hours; and use panchromatic film all season.

Trade Hints and New Books

The Outdoor Exposure Guide is a leaflet explaining in detail the various factors entering into exposure. Various outdoor photo-

(Continued on page 325)



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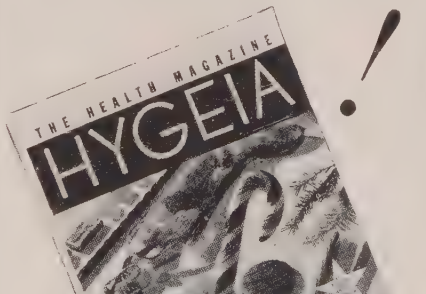

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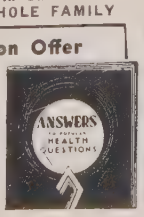

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IN THIS ISSUE

Photographic Notes . . . . . Samuel Brown 322
In December . . . . . Howard Zahniser 327
Wild Sentinels . . . . . Archibald Rutledge 329
Know the Evergreens . . . . . E. E. Stanford 333
Head-Hunting . . . . . Stephen Haweis 336
The Black Witch . . Florence Moore Grimshawe 337
Flowers of the Passion . . . . . Henricks Hodge 339
Late November (Poem) . . . . . Mildred H. Sisson 341
The Last Chicken Hunt . . . . Walter M. Rosene 342
Benediction (Poem) . . . . Grace May Stutsman 344
Pine Owl . . . . . E. E. Stanford 344
Nature in Rotogravure 345–360
The Handicraft of Weather . . . Ivan E. Houk 345
The Angel-Wing Shell . . . . . Ivan R. Tomkins 350
What is Convergence? Paul Griswold Howes 354
Habitat Groups at Carnegie Museum 358
Conservation Editorials 361
"Upon Thy Belly Shalt Thou Go—" Elsie A. Parry 363
To a Water Lily (Poem) Nathalie Thurston Shelton 364
Things to Think About 365
Parents, Children and the Outdoors Elizabeth Grunder 366
The Quarry (Poem) . . . . . Lawrence R. Holmes 368
Supernovas and the Crab Nebula in Taurus Isabel M. Lewis 369
Gardens! Gardens!! Everywhere!!! George L. Alpers 372
Nature Magazine in School . . . . . Esther Scott 374
Under the Microscope . . Julian D. Corrington 376
Diana Thorne's Dog Column 379
Index to Volume 30 382

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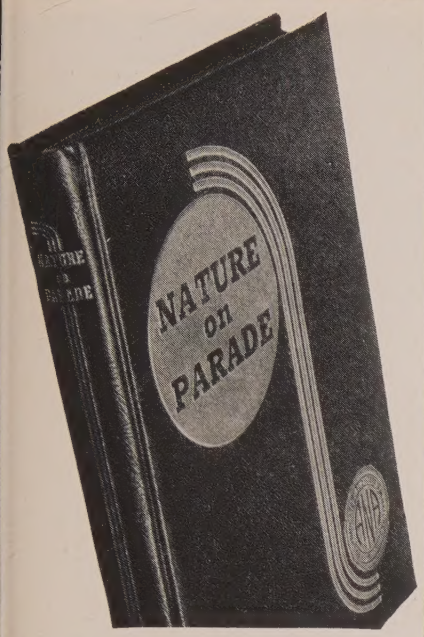

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PHOTOGRAPHIC NOTES

(Continued from page 323)

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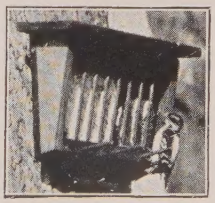

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Indoors and Out

By HOWARD ZAHNISER

DALLAS LORE SHARP once exclaimed: "The first snowstorm! I would not miss seeing the first snowstorm, not if I had to climb up to my high, tarry, smoky roof in the city and lie down on my back, as I once did, in order to shut out everything but the gray wavering flakes that come scattering from the sky."

As for myself, I too would not miss the first snowstorm, not if I lived so near the torrid zone that I should have to see it in pictures and feel it in imagination. And if I thought that before December comes I would have to travel beyond the snow scenes I think that I would surely carry with me some of the books that Dallas Lore Sharp himself wrote, and with them travel back in armchair to the regions of snowstorms. If so, I am sure there would be a special evening on December 13, when my author would have been sixty-eight years old had death not overtaken him eight years ago (on November 29, 1929). On that anniversary December evening I should take special delight in looking for snow scenes in *Wild Life Near Home, Roof and Meadow, The Lay of the Land, The Face of the Fields, Beyond the Pasture Bars, The Whole Year Round, The Hills of Hingham, The Year Out of Doors,* and *Highlands and Hollows.* I know that I should not be disappointed, for I am even now on a long journey and I have carried some of these books with me.

Wild Life Near Home brings a double reward of searching, for this first book of Dallas Lore Sharp is also the first volume illustrated by R. Bruce Horsfall, whose art has become so familiar and welcome to the readers of NATURE MAGAZINE. In the midst of a chapter on "Some Snug Winter Beds," for one example, Mr. Horsfall's illustration of Sharp in a storm, standing near snow-capped shocks of corn watching crows fly toward the pines, with the legend, "I shivered as the icy flakes fell thicker and faster," could surely make one both homesick for snowstorms and thankful for a snug armchair.

I can find again in *The Year Out of Doors* Sharp's praise of the first snowstorm and other word pictures of winter—the crow in the swaying pine top, the kinglet in the "close-armed cedar", the wild duck "riding out the storm in his freezing water hole." A storm in summer Sharp characterized as an incident, but a storm in winter as an event. He described the three great silences and the three great voices of winter: The wide sudden silence at twilight with the coming of the first winter frost, the smothered hush when the storm breaks, and the crystal stillness at night; the voices of the north wind, of the pine forest, and of the surf on a stormy shore.

I can also turn at will, in *The Lay of the Land,* or in either of two other Sharp volumes, to his essay on "Christmas in the Woods," carrying me with him back to his boyhood days of 'possums and persimmons. In *Beyond the Pasture Bars* there is "A Song of the Winter Woods." *The Face of the Fields* tells of "Hunting the Snow." And *The Hills of Hingham,* written in war time, has a brave essay on "The Christmas Tree," with the testimony and hope: "If I cannot sing peace on earth, I still believe in it; if I cannot hear the angels, I know that Christ was born, and that Christmas is coming. It will not be a very merry Christmas, but it shall be a most significant, most solemn, most holy Christmas. . . . I hope it snows."

But browsing thus with a taste for things in season is certain to whet other appetites, and there is indeed a bounty in the works of Dallas Lore Sharp, who in his various times was not only a naturalist, but a Methodist Episcopal pastor, a member of the editorial staff of *Youth's Companion,* an educator and college professor of English, a candidate for the United States Senate, and an American traveler and lecturer. Two posthumous volumes by the Rev. Mr. Sharp tell of *Romances from the Old Testament* and of *Christ and His Time.* For the "Reading with a Purpose" series, the Professor Sharp contributed *Some Great American Books.* Two other small volumes —*Patrons of Democracy* and *Education in a Democracy* —discuss public-school problems. The educator-philosopher speaks best, I think, in *The Magical Chance.* A rare privilege it must have been to sit at the feet of Professor Sharp. To a Boston girl whose composition of "poetry" came by coincidence to the class's attention on the day her engagement to a Chicagoan was announced in the morning press, Dallas Lore Sharp read aloud her verses:

The world seems black and ugly
When I shut the Fairy Door;
I want to go to Fairyland
And live forevermore.

Then he asked quickly, Do you really mean this? Do you really want to leave Boston for Fairyland instead of Chicago? So enlightening is this book. "There is a deposit . . . of the radium of romance in the slag of all souls," "the earth is as young as it ever was," Sharp declares, and "life offers us all the chance to escape. . . . Beneath the surface we need go no deeper than our own hearts to find a frontier."

The same awareness of "the magical chance" is apparent in the works of Sharp the naturalist, suggested, for example, in the title chosen for his first volume, *Wild Life Near Home,* and in the comment once made by another that Sharp's "acquaintance with the farm and its tenants the smaller wild animals is particularly intimate and sympathetic." Sharp was born in Haleyville, N. J., and he spent many boyhood days in the near-by Maurice River marshes. That he realized then his "magical chance" is clear to the reader of his inspired essay on "The Marsh" included in *Roof and Meadow.* Something of this same enthusiasm for the thing at hand, though admired in another rather than as personally experienced, is, I think, the essence of "Turtle Eggs for Agassiz" in *The Face of the Fields,* probably the best known writing of Sharp, one of the most striking, and cer- (Continued on page 380)

EGRETS STAND SENTINEL WHILE OTHERS ARE INCUBATING THE EGGS OR FEEDING THE YOUNG